U.S. Government

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(Formerly U.S. Government Research Reports)

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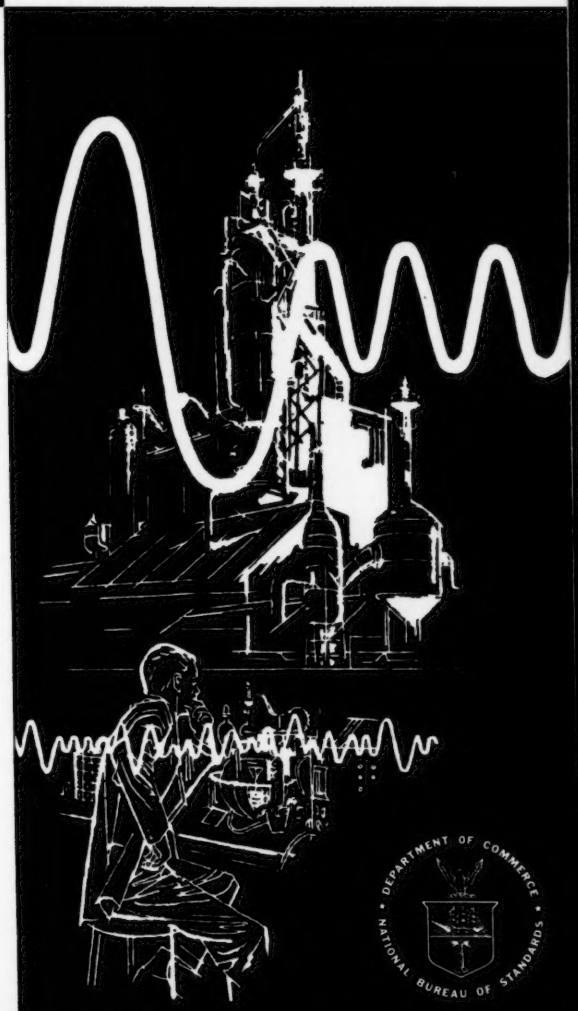

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U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS (formerly U.S. Government Research Reports) is published by the Clearinghouse for Federal Scientific and Technical Information to announce the availability to the public of new reports of U.S. Government-sponsored research and development released by the Department of Defense and other Federal agencies. The Atomic Energy Commission and the National Aeronautics and Space Administration issue their own announcement journals as noted below.

FORMAT

USGRDR contains two sections with a combined table of contents. The first section, "Technical Abstract Bulletin" (TAB), announces reports released by the Defense Documentation Center (DDC) of the Department of Defense. The second section, "Other Research Reports and Related Material," announces reports released by civilian agencies and also includes certain older military reports. Reports are listed by report/accession number under 33 subject division headings. Both sections contain abstracts and complete bibliographic citations and are followed by their respective indexes.

HOW TO USE

Readers are urged to review all abstracts in their fields of interest, noting report/accession numbers and titles of reports to be ordered. Although primarily for retrieval, the descriptors provide a quick grasp of a report's scope. The reader is reminded that reports applicable to his field may be found under various subject divisions; the various indexes will aid in locating those reports. Cumulative indexes are published periodically.

TO ORDER REPORTS

Order reports by report/accession number (as given on the first line of each entry) and title from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche copy (MF) are given for each entry. Prepayment is required unless purchases are to be charged to Superintendent of Documents deposit account. Order forms will be found in the back. Make check or money order payable to National Bureau of Standards—CFSTI.

OTHER JOURNALS

Reports of the National Aeronautics and Space Administration and the Atomic Energy Commission can be ordered from the Clearinghouse. Reports available are listed in the following journals open to public subscription from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

NUCLEAR SCIENCE ABSTRACTS, Atomic Energy Commission, $30 a year domestic, $37 foreign, $1.75 single copy plus 25 percent foreign mailing.

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS. National Aeronautics and Space Administration, $25 a year domestic, $31 foreign, $1.50 single copy plus 25 cents foreign mailing.

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Bernard M. Fry, *Director*

Contents may be reprinted freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 30, 1961.

SPECIAL Announcements

NEW INDEXES IN USGRDR

There are three new indexes to the TAB portion of this journal--corporate author-monitoring agency, personal author, and contract. These are in addition to the subject and AD-division indexes.

Instructions on how to use all of the TAB indexes may be found immediately preceding the indexes.

A new contract number index has been added for the "Other Research Reports" section. This is in addition to a corporate source index and an accession-report number index.

COMMERCE ESTABLISHES "CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION"

A Clearinghouse for Federal Scientific and Technical Information to serve as the central source for Government research data in the physical sciences and engineering has been established in the U. S. Department of Commerce, and has taken over the document distribution program of the Office of Technical Services.

Development of the Clearinghouse was endorsed last February by the Federal Council for Science and Technology as a step toward making results of Federally-sponsored research and development more readily available to industry, universities, scientists and engineers. Through this interagency endorsement, unclassified technical reports and translations generated by all Government agencies will be made accessible through a single agency. In addition the Clearinghouse has been charged with the responsibility for providing information on Federal research in progress and operating a referral service to sources of specialized technical expertise in the Government.

The Clearinghouse has undertaken an expansion of staff and facilities and is now moving to carry out these missions. The agency is using computer and other modern data processing and reproduction equipment and techniques in order to speed and increase the flow of technical information to scientists and engineers throughout the country. To further increase efficiency, all Clearinghouse personnel and facilities were established in a new building in Springfield, Va., near Washington, in October.

The Clearinghouse is a part of the new Institute for Applied Technology in the National Bureau of Standards. The Institute is headed by Dr. Donald A. Schon. The director of the Clearinghouse is Bernard M. Fry.

In addition to providing research information to industry, the Clearinghouse is designed to reduce duplication in both industry and Government in research and information processing. Substantial savings to the Government will be realized as a result of reducing duplication of document processing and distribution within the Government.

A major step in this direction was a recent agreement between the Department of Commerce and the Department of Defense whereby the Clearinghouse assumed the task of processing all unclassified/unlimited DoD research reports, as well as reproduction and distribution of these documents to both the public and DoD agencies and contractors.

Hereafter, orders for documents formerly handled by OTS should be addressed to Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151.

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FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. Government agencies and provides reference, interlibrary loan, and reproduction services.

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of California
General Library
Berkeley, Calif. 94704

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

CUMULATIVE INDEXES

The following Cumulative Indexes for U. S. Government Research and Development Reports (formerly U. S. Government Research Reports) are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., 20402:

Volume 38	Annual Cumulative Index January - December 1963 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Cumulated Index May - December 1963 Includes Technical Abstract Bulletin only.	$3.50
	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50
Volume 37	Annual Cumulative Index January - December 1962 Includes "Non-Military and Older Military Research Reports" section only.	$1.00
	Semi-annual Cumulative Index July - December 1962 Includes Technical Abstract Bulletin only.	$3.50
	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
Volume 36	July - December 1961	$3.50
Volume 35	January - June 1961	$1.00
Volume 34	July - December 1960	$1.00
Volume 33	January - June 1960	$1.00
Volume 32	July - December 1959	$1.00

For information regarding the availability of earlier indexes write to the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151.

TECHNICAL ABSTRACT BULLETIN

1. Aircraft and Flight Equipment

AD-608 515 Div. 1
OTS Prices: HC $3.00/MF $0.50

Institute for Aerospace Studies, Univ. of Toronto (Ontario).
PERFORMANCE, OPERATION, AND USE OF LOW-ASPECT-RATIO JET-FLAPPED WINGS,
by G. K. Korbacher. Aug 64, 44p UTIAS-97
Grant DA 44 177 AMC 63 G9, Task 1D121401A14203
TRECOM TR64 38

Unclassified report

Descriptors: (*Wings, Jet flaps), (*Jet flaps, Operation), (*Short take-off planes, Wings), Aspect ratio, Mathematical analysis, Propulsion, Drag, Lift, Performance (Engineering).

The characteristics of a jet-flapped wing of aspect ratio 6 are presented, discussed, and evaluated for STOL application. Again, as for high-aspect-ratio (AR = 20) jet-flapped wings, a range for the most economical jet-flap operation is well defined. The angle of attack as an efficient means of lift production loses its usefulness with low-aspect-ratio jet-flapped wings, whereas the optimum jet-deflection angle seems hardly affected. A most efficient jet-flap application for STOL calls for a complete integration of the lifting and propulsive systems. In the range of most economical jet-flap operation, semi-empirical relationships predict parameter changes accurately enough for practical purposes. (Author)

AD-608 522 Div. 1, 9
OTS Prices: HC $3.00/MF $0.75

Princeton Univ., N. J.
THE DOMINANT AERODYNAMIC CHARACTERISTICS OF A SHAPED GEM,
by A. F. Wojciechowicz, Jr., W. B. Nixon, and T. E. Sweeney. Sep 64, 47p AER-684
Contract DA44 177TC850, Task 1D021701A04803
TRECOM TR64 45

Unclassified report

Descriptors: (*Ground effect machines, Aerodynamic characteristics), Stability, Aerodynamic loading, Moments, Lift, Aerodynamic configurations, Mathematical analysis, Pitch (Motion), Geometric forms, Performance (Engineering), Wind tunnel models, Flight.

The effects of aerodynamic forces and moments acting on a ground effect machine in forward flight are investigated in some detail. Emphasis is placed upon the performance gains possible by shaping a GEM to maximize lift at zero degrees angle of attack. The associated longitudinal stability and trim problem is discussed, and at least one solution presented. The work is both theoretical and experimental, the latter utilizing wind-tunnel models of a reconfigured P-GEM and also the full-scale P-GEM. Flight test results prove the validity of the concept and are extrapolated to higher airspeeds than those attainable with the P-GEM. (Author)

AD-608 523 Div. 1, 11
OTS Prices: HC $6.00/MF $1.50

Martin Marietta Corp., Orlando, Fla.
RECIRCULATION PRINCIPLE FOR GROUND EFFECT MACHINE: PRELIMINARY DESIGN OF A RESEARCH VEHICLE.
Rept. for Aug-Dec 63,
by K. R. Cossairt. Aug 64, 232p OR-3725-1
Contract DA44 177AMC96T, Task 1D021701A04804
TRECOM TR64 27

Unclassified report

Descriptors: (*Ground effect machine, Aerodynamic characteristics), (*Aerodynamic characteristics, Ground effect machine), Fluid flow, Performance (Engineering), Air ejectors, Ducts, Aerodynamic configurations, Design, Fluid dynamic properties, Gas turbines, Control systems, Motion, Model tests, Gas flow, Automatic pilots, Jets.

The ejector recirculation lift system was investigated as means of improving the internal-flow and performance characteristics of air cushion vehicles. The concept permits larger unobstructed stowage areas and lower structural weight. In addition, the system minimizes the performance degradation of air cushion vehicles associated with higher speed and increased base pressure. The study involved two phases: ejector optimization and fabrication of an air source having the mass flow and pressure characteristics necessary for a vehicle of moderate size. The results indicate that an energy recovery system of this type is feasible and that performance may be predicted with the same degree of accuracy as for conventional axial flow fan/duct/nozzle systems. (Author)

AD-608 526 Div. 1, 9, 26
OTS Prices: HC $3.00/MF $0.75

Therm Advanced Research, Inc., Ithaca, N. Y.
THE DUCTED PROPELLER IN STATIC AND LOW-SPEED FLIGHT,
by M. D. Greenberg and D. E. Ordway. Oct 64, 59p
TAR-TR-6407
Contract Nonr4357 00

Unclassified report

Descriptors: (*Shrouded propellers, Aerodynamic loading), Propellers (Aerial), Flight, Hovering, Propeller blades, Camber, Thrust, Pressure, Vortices, Iterative methods, Integral equations.

A theory is developed for the steady aerodynamic loading on a ducted propeller with finite blade number in static and low-speed flight. The interaction of the higher harmonics with the steady loading is clarified and it is shown that, in a rigorous sense, a high blade-number restriction is required. For a shroud of small camber and zero thickness an analytic solution is obtained, together with simple expressions for shroud thrust and surface pressures, subject to a constant-pitch assumption on the trailing propeller vortices. To be more precise, the pitch hypothesis is dropped and an alternative iterative solution

pursued. The final results, however, of an illustrative calculation indicate that the two solutions do not differ significantly. Results of a limited comparison with experiment are quite reasonable. (Author)

AD-608 532 Div. 1, 32
OTS Prices: HC $3.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus. Psycholinguistic Lab.
THE PRONUNCIATION OF ENGLISH AIR TRAFFIC CONTROL WORDS BY CONTROLLERS FROM TWELVE ICAO NATIONS.
Final rept.
by H. M. Moser. Jul 64, 46p
Contract FAA/BRD407, Proj. 113 026R
FAA RD64 123

Unclassified report

Descriptors: (*Air traffic controllers, Speech representation), (*Speech representation, Air traffic controllers), Speech, Intelligibility, Speech recognition, Vocabulary, Language, Communication systems, Training devices, Records, Aviation personnel, Dictionaries.

Selected English air traffic control words and phrases were recorded as pronounced by controllers in twelve ICAO nations. These recordings were analyzed and lexicons of variant pronunciations of these words which might be encountered in various places were produced. A summary lexicon is included, as is a guide for recommended pronunication of the words. The procedures for gathering and analyzing the data and a method of pronunciation representation are also discussed. (Author)

AD-608 601 Div. 1
OTS Prices: HC $5.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
PILOTING PECULIARITIES OF JET AIRCRAFT,
by M. L. Gallai. 22 Sep 64, 197p
FTD MT64 148; TT 65 60265

Unclassified report

Edited machine trans. of mono. Osobennosti Pilotirovaniya Reaktivnykh Samoletov, Moscow, 1962, 196p.

Descriptors: (*Jet planes, Aeronautics), (*Aeronautics, Jet planes), Flight, Aerodynamic configurations, Aircraft, Take-off, Landings, Climbing, Acceleration, Flight speeds, High altitude, Pilots, Turboprop engines, Turbojet engines, Equations, USSR.

Examined in detail are such questions of aerodynamics which are necessary for understanding the peculiarities of piloting jet aircraft, but which exceed the bounds of the normal course in theory of flight received in flying schools, DOSAAF schools, and the Civil Air Fleet. Material contained in the book is applicable to subsonic jet aircraft with turbojet motors (turbojet engine) used in DOSAAF and the Civil Air Fleet, such as the MIG-15, Tu-104, etc. Digressions deal with the peculiarities of supersonic jet aircraft. Aircraft having related types of motors (for example, turboprop engines) are also discussed.

AD-608 620 Div. 1
OTS Prices: HC $6.00/MF $1.25

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
FLIGHT EVALUATION OF VARIOUS SHORT PERIOD DYNAMICS AT FOUR DRAG CONFIGURATIONS FOR THE LANDING APPROACH TASK,
by Charles R. Chalk. Oct 64, 220p CAL-TB-1630-F-3
Contract AF33 657 7442, Proj. 8219, Task 821905
FDL TDR64 60

Unclassified report

Descriptors: (*Approach, Aircraft landings), (*Flight speeds, Approach), (*Flight, Dynamics), Drag, Lift, Thrust, Control, Dumping, Aircraft, Flight paths, Aeronautics, Turbulence, Stability, Pilots, Equations, Aerodynamic configurations, Aerodynamic characteristics.

The T-33 variable stability and variable drag airplane was used in a flight program to evaluate various longitudinal short period characteristics at each of four drag configurations for the landing approach task. Pilot rating and comment data were collected and used to determine short period requirements for the landing approach task. The importance of the slope of the thrust required vs. velocity curve is discussed and related to pilot comments and control difficulties. The longitudinal control gain selected by the pilot was a function of short period frequency and damping ratio. Curves relating control authority and short period frequency and damping ratio are derived from these data. The power spectral density of the pilot's elevator stick motion was found to be significantly affected by short period dynamics and atmospheric turbulence. (Author)

AD-608 621 Div. 1
OTS Prices: HC $4.00/MF $1.00

Systems Technology, Inc., Inglewood, Calif.
EXTENSION OF LINEAR CONSTANT-COEFFICIENT ANALYSIS METHODS TO TIME-VARYING SYSTEMS.
Final rept. for Mar 62-Oct 63,
by Walter A. Johnson, Duane T. McRuer, and Anil V. Phatak. Sep 64, 129p
Contract AF33 657 8294, Proj. 8219, Task 821904
RTD TDR63 4178

Unclassified report

Descriptors: (*Flight control systems, Mathematical analysis), Time, Control systems, Stability, Perturbation theory, Power series, Series, Differential equations, Functions, Integral transforms, Algebra, Homing devices, Approach, Landings, Dynamics.

Time-varying control system analysis is approached as an extension of well-understood constant-coefficient concepts. For system characterization, kernel functions and system functions are evolved by analogy with their constant-coefficient counterparts -- weighting functions and transfer functions. For quantitative response information, a constant-coefficient series technique is developed in which the sum of a few constant-coefficient system responses is often sufficient to approximate the response of a time-varying system. The qualitative response or stability nature of certain time-varying systems is also treated. Several examples are given to illustrate each concept presented. (Author)

AD-608 662 Div. 1, 7
OTS Prices: HC $2.00/MF $0.50

Gulton Industries, Inc., Metuchen, N. J.
INVESTIGATION OF HERMETICALLY SEALED, MAINTENANCE FREE, HIGH RATE, NICKEL-CADMIUM BATTERIES FOR AIRCRAFT APPLICATION.
Quarterly technical progress rept. no. 1,

by E. Kantner, W. Leschek, S. Jaffe, and R. C. Shair.
Nov 64, 37p.
Contract AF33 615 2087, Proj. 8173, Task 81730418
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Alkaline cells, Airborne), (*Batteries and components, Airborne), Tests, Polarization, Nickel, Cadmium, Cadmium compounds, Hydroxides, Electric currents, Measuring devices (Electrical and electronic), Voltage, Hermetic seals, Maintenance, Resistance (Electrical), Electrochemistry, Aircraft engines.

An MS-24498 battery was subjected to high rate discharges at room temperature and at -22F, to determine what factors are responsible for the high voltage loss. Polarization was found to be the major factor. Sintered plaques of 0.020 in, 0.035 in., and 0.050 in., thickness were prepared, impregnated and formed in preparation for cell assembly. These cells are used for studying polarization and charge efficiency of sealed nickel-cadmium cells during high rates of charge and discharge. High purity nickel and cadmium salt solutions were prepared. These solutions are used to impregnate plates for studying self-discharge in sealed nickel-cadmium cells. VO-6 cells, containing Adhydrodes, were overcharged at sufficiently high currents to maintain internal cell pressures ranging from 5 psi to 65 psi. The Adhydrode power output, as a function of Adhydrode to cathode load resistance at these various pressures, were determined. Cd/Cd (OH)2 coulometers were fabricated for studying their voltage characteristics. (Author)

AD-608 687 Div. 1, 19
OTS Prices: HC $1.00/MF $0.50

Texas Instruments, Inc., Dallas.
PROJECT 666A TERRAIN CLEARANCE RADAR SUBSYSTEM.
Monthly letter progress rept. for 15 Oct-15 Nov 64,
by Lawrence E. Frase. 20 Nov 64, 4p
TII-U25-69315-25
Contract AF33 657 9938
Unclassified report

Descriptors: (*Systems engineering, Guidance), (*Terrain avoidance, Automatic pilots), (*Automatic pilots, Terrain avoidance), Automatic navigators, Radar equipment, Flight control systems, Coupling circuits, Gain, Low altitude.

AD-608 722 Div. 1
OTS Prices: HC $3.00/MF $0.75

Federal Aviation Agency, Washington, D. C.
A SYSTEM DESIGN FOR THE PROVISION OF A SAFER, MORE ECONOMIC, AND MORE EFFICIENT AIR TRAFFIC SERVICE FOR THE ICAO NORTH ATLANTIC REGION.
Aug 64, 95p
Unclassified report

Rept. on Proj. SPANAT.

Descriptors: (*Aviation safety, Air traffic control systems), (*Air traffic control systems, Atlantic Ocean), (*Atlantic Ocean, Air traffic control systems), Systems engineering, Communication systems, Meteorology, Naviagtion, Flight paths, Polar regions, Jet planes, Commercial planes, Transport planes, Data processing systems.

The ICAO Fourth North Atlantic Regional Air Navigation Meeting adopted a recommendation which called for the introduction of a systems planning concept to the ICAO North Atlantic Region. Following acceptance of this recommendation by the ICAO Council, the Federal Aviation Agency (FAA) established a team of experts designated the 'Systems Planning Approach North Atlantic Team' (SPANAT) to undertake the development of a system design directed toward attainment of the proposed goals. Specifically, the Team was to attempt to produce a system design plan which would, for the time period encompassed, provide the most practical solutions to the major problems incident to the provision of safe, regular, and efficient air operations in the North Atlantic Region. In developing the systems design plan for the North Atlantic, the Team received invaluable assistance from other Agencies and from various components of the airline industry. The demonstration system design plan, while considered valid in terms of the present technical state-of-art and in terms of the traffic forecasts which have been developed in concert with other principal North Atlantic Provider States, is not to be construed as necessarily representing, in all of its details, firm Agency positions.

AD-608 751 Div. 1, 9
OTS Prices: HC $7.00/MF $2.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
DESIGN OF FLYING CRAFT: SELECTED CHAPTERS,
by V. L. Bel'skii and I. P. Vlasov. 30 Nov 64, 389p
FTD TT64 1018; TT 65 60407
Unclassified report

Unedited rough draft trans. of mono. Konstruktsiya Letatel'nykh Apparatov, Moscow, 1963, p. 85-113, 124-386, 445-464.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft, Design), (*Guided missiles, (Surface-to-surface), Design), Aerodynamic configurations, Aerodynamic characteristics, Trajectories, Helicopters, Wings, Tails (Aircraft), Airframes, Aerodynamic loading, Structural parts, Structural properties, Control surfaces, Construction, Stresses, Landing gear, Vibration isolators, USSR, Rockets.

Contents:
Ballistic Rockets; Helicopters; External Loads Acting on a Flying Craft; Wing Loads; The Structural Elements of a Wing and Their Carrying Capacity; Structural Wing Designs; Strength Calculation for a Wing; Strength Calculations for Sweptback and Triangular Wings; Design of Tail Control Surfaces and Ailerons; Wing Mechanization; The Loads on the Airframe of a Flying Craft; The Construction and Strength of an Airframe; Landing-Gear Construction.

AD-608 806 Div. 1, 5
OTS Prices: HC $3.00/MF $0.75

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF AUTOMATIC TERMINAL INFORMATION SERVICE APPLICATIONS.
Final rept.,
by Enoch H. Wright. Sep 64, 66p
Proj. 150 513 02V
FAA RD64 135
Unclassified report

Descriptors: (*Air traffic control terminal areas, Recording systems), (*Terminal flight facilities, Effectiveness), Feasibility studies, Data transmission systems, Voice communication systems, Radio transmission, Automatic.

The purpose of this project was to evaluate applications of Automatic Terminal Information Service at several types of terminal areas using varied procedures and radio facilities to broadcast the information. Tests using automatic recording and broadcast equipment were conducted in the Van Nuys and San Francisco/Oakland, California terminal areas and the Chicago, Illinois O'Hare Airport terminal area. The information was broadcast on the voice channels of VOR test facilities, navigational aids and a discrete frequency. Based on the results of the evaluation, it was concluded that, although interference problems may exist in some locations, the VOR test facilities, modified with a voice channel and increased output power was a satisfactory method of transmitting a combined arrival and departure Automatic Terminal Information Service message, resulting in reduced controller workload and radio frequency congestion. It was also concluded that although the use of a navigation facility voice channel was a satisfactory method of transmitting Automatic Terminal Information Service arrival messages, it precluded the use of such a facility for weather broadcast and ground/air communications at some locations. It was also concluded that the sequential transmission of Automatic Terminal Information Service messages for two or more airports over the same voice channel was unsatisfactory. It was further concluded that the use of a discrete frequency was a satisfactory method of transmitting combined arrival and departure messages. (Author)

AD-608 843 Div. 1, 28
OTS Prices: HC $3.00/MF $0.75

Aeronautical Research Labs., Melbourne (Australia).
REVIEW OF PROJECTED DISPLAYS OF FLIGHT INFORMATION AND RECOMMENDATIONS FOR FURTHER DEVELOPMENT.
Human Engineering rept.,
by J. R. Baxter and J. D. Worman. Aug 62, 82p
ARL/HE-2
N63 19905

Unclassified report

Prepared in cooperation with and under contract to the Federal Aviation Agency, Washington, D. C.

Descriptors: (*Display systems, Landing aids), (*Landing aids, Display systems), (*All-weather aviation, Display systems), (*Human engineering, Landing aids), Aviation safety, Instrumentation, Monitors, Automatic, Flight testing, Test methods, Flight paths, Approach, Flight speeds, Visual signals, Guidance, Markers, Navigation, Take-off, Optical images, Aircraft, Flight simulators.

Five projected displays of flight information proposed by organizations in the United States, England and Australia were reviewed and compared in respect to information content, simplicity and compatibility with the outside world. All five were shown to have associated problems of various types. A series of new displays, based on similar concepts but designed to eliminate the less desirable features of the others, were therefore proposed for simulator and flight evaluation. These new displays vary in respect to the type of flight director provided, and a complete test program was prepared to evaluate them in detail. (Author)

AD-608 847 Div. 1, 23
OTS Prices: HC $3.00/MF $0.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
SIMULATOR EVALUATION OF AIRPLANE LONGITUDINAL RESPONSES FOR THE INSTRUMENT-LANDING APPROACH,
by F. D. Newell. Oct 64, 61p TB-1630-F-2
Contract AF33 657 7442, Proj. 8219, Task 821905
FDL TDR64 84

Unclassified report

Descriptors: (*Instrument landings, Performance tests), (*Flight paths, Configuration), Reliability, Acceptability, Pilots, Aviation safety, Simulators, Analog computers, Climbing, Descent, Level flight, Drag, Lift, Pitch (Motion).

A precision instrument maneuver including holding heading straight and level, climbing and descending, and climbing and descending turns was flown in a fixed-base simulator for many different combinations of drag, lift and pitch characteristics. Two pilots evaluated the effects of these characteristics on their ability to perform an instrument landing approach in a single-pilot, high-performance airplane. (Author)

AD-608 850 Div. 1, 9
OTS Prices: HC $1.00/MF $0.50

Air Force Flight Dynamics Lab., Research and Technology Div., Wright-Patterson AFB, Ohio.
ELASTIC MODE EFFECTS ON THE DYNAMICS OF A DELTA-WINGED AIRCRAFT.
Final rept. for May-Sep 63,
by Robert L. Swaim. Oct 63, 20p FDCC-TM-63-2
Proj. 8219, Task 821901
N63 22960

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft, Delta wings), (*Dynamics, Aircraft), (*Elasticity, Aircraft), Control, Errors.

An examination is made of some effects of rigid body-elastic mode coupling on the longitudinal dynamics of a highly flexible delta-winged aircraft. In particular, the influence of the coupling on the automatic control system's ability to provide preselected short-period dynamics is investigated. Also, a brief check is made of the sensitivity of the dynamics to small errors in elastic mode shape. The coupling is shown to be quite severe, precluding the establishment of 'ballpark' control element gain values with only a rigid-body dynamic analysis. In addition, very high accuracy is needed in determining elastic mode shapes, since the strong coupling renders the dynamics objectionably sensitive to small errors in elastic mode shape data. (Author)

AD-608 865 Div. 1
OTS Prices: HC $7.80/MF $2.25

General Dynamics/Convair, San Diego, Calif.
ENGINEERING SUMMARY OF AIRFRAME ICING TECHNICAL DATA.
Technical rept.,
by D. T. Bowden, A. E. Gensemer, and C. A. Skeen.
Dec 63, 480p
Contract FA WA4250, Proj. 343 12H 1
FAA ADS4; PB 166 289

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aircraft equipment, Ice prevention), (*Ice prevention, Aircraft equipment), (*Airframes, De-icing systems), Ice formation indicators, Ice, Physics, Clouds, Helicopters, Control systems, Test methods, Statistical data, Engineering, Transport planes, Design.

The report presents data on aircraft icing conditions, methods of preventing and removing ice on aircraft in flight, and methods of testing ice protection systems to ensure adequacy. The first section discusses statistical icing data to be used as design criteria for ice protection evaluations and systems. The second section is concerned with the physics of ice collection, and presents formulas and charts for determination of the rate, size, and shape of ice formations on aircraft. The third section discusses the known methods of ice protection, and presents formulas and data to be used in design. The fourth section shows specific and typical applications of ice protection systems to light and heavy aircraft. The fifth section presents data on detection of icing by visual means and by ice detector and indicator systems. The final section discusses the various methods of testing aircraft for adequacy of icing protection with and without ice protection systems. Included are data on icing tunnel testing, dry air flight testing, flight testing in natural icing, and flight in simulated icing. (Author)

AD-608 866 Div. 1
OTS Prices: HC $5.00/MF $1.00

Bollay (E) Associates, Inc., Goleta, Calif.
NATIONAL AIRSPACE SYSTEM AVIATION WEATHER SUBSYSTEM DESIGN.
Final rept.
by W. P. Slover. Oct 64, 158p
Contract FA WA4403, Proj. 131 311 05A, Task 3
FAA RD64 129 Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*All-weather aviation, Air traffic control systems), (*Air traffic control systems, All-weather aviation), (*Weather forecasting, All-weather aviation), Aeronautics, Flight paths, Meteorological parameters, Communication systems, Data processing systems, Aviation safety.

The Federal Aviation Agency is developing the aviation weather system, as part of the National Airspace System, to satisfy the common requirements of civil and military aviation for operational weather support. Elements of the design have been and are continuing to be coordinated with the Department of Defense and the Department of Commerce. This report is a detailed summary of an aviation weather system designed to support the goals of the National Airspace System. Due consideration has been given to the economic and political constraints imposed by the system's environment, the benefits accruing from a common system for all users, and the necessity for implementing system improvements in a practical, orderly manner. The service to be provided to the system users, Air Traffic Control, pilots, and military and private flight operations, is described. The system design, concepts and requirements are stated and the overall operation outlined. Then the system is divided into four subsystems - Observing, Processing, Presenting, and Communications - for detailed consideration of the elements making up the aviation weather system. (Author)

2. Astronomy, Geophysics and Geography

AD-608 484 Div. 2, 20
OTS Prices: HC $3.00/MF $0.75

Queen's Univ., Belfast (Northern Ireland).
RESEARCH ON PHYSICS OF THE UPPER ATMOSPHERE.
Final technical rept.
by D. R. Bates, A. Dalgarno, B. L. Moiseiwitsch, A. L. Stewart, and A. H. Jarrett. 30 Jun 64, 65p
Grant AF EOAR63 85
AFCRL 64 876

Unclassified report

Descriptors: (*Upper atmosphere, Scientific research), (*Geophysics, Upper atmosphere), Atmospheric temperature, Diurnal variations, Optical properties, Night sky, Infrared spectroscopy, Sky brightness, Nuclear cross sections, Ionization, Nuclear scattering, Electrons, Nuclear physics.

Investigations directly concerned with the upper atmosphere include: Theoretical studies of dirunal variation of the temperature of the thermosphere and Observational studies of the following: temperature of OI atoms responsible for the 6300 A emission of the nightglow, the 6300 A OI dayglow emission, variations of hydroxyl and oxygen emissions in the infra-red airglow, infra-red investigations of the night sky using a Michelson interferometer, and all-sky interferometer for airglow studies. Fundamental quantal calculations of collisional processes and atomic structural problems are also examined Collisional processes include: Calculations of scattering cross sections using the first and second Born approximations, impact ionization cross sections, and photo-ionization cross sections of molecular hydrogen. Atomic structural problems include: Semi-empirical effective potentials for use in atomic, molecular and solid-state problems; three-electron systems, and long range forces between pairs of atoms.

AD-608 494 Div. 2, 8, 25, 30
OTS Prices: HC $3.00/MF $0.75

Upper Air Research Lab., Univ. of Utah, Salt Lake City.
A PLASMA RESONANCE AND ELECTRON TEMPERATURE EXPERIMENT.
Scientific rept. no. 3,
by Alvin M. Despain. 3 Aug 64, 85p
Contract AF19 628 447, Proj. 8653, Task 865302
AFCRL 64 809

Unclassified report

Descriptors: (*Ionosphere, Plasma physics), (*Plasma oscillations, Resonance), Electron density, Temperature, Test methods, Antennas, Probes (Electromagnetic), Test equipment, Timing circuits, Multiplex, Coupling circuits, Amplifiers, Telemetering data, Rocket research.

The report discusses some plasma and ionosphere parameters, investigates some appropriate measurement techniques, considers the design of a rocket-borne experiment to measure plasma resonance and electron temperature, and presents some preliminary flight results. A rocket-borne experiment that measures the electrical characteristics of a probe or antenna can yield the ionospheric electron density and temperature parameters. Such an experiment was designed to measure the dc volt-ampere characteristics of a rocket-borne radio frequency excited probe. The flight results exhibited some interesting features. The expected plasma resonance was clearly evident in addition to other unexpected phenomena that were also observed. Preliminary data analysis produced measurements of electron temperature that compare reasonably well to the expected values.

AD-608 495 Div. 2, 4
OTS Prices: HC $1.00/MF $0.50

Birmingham Univ. (England).
IONIC REACTIONS IN THE IONOSPHERIC GASES.
Annual summary rept. no. 1, 8 Jan 63-9 Jan 64,
by M. J. Copsey and D. Smith. 1 Jan 64, 11p
Grant AF EOAR63 74
AFCRL 64 892

Unclassified report

Descriptors: (*Ionosphere, Gas ionization), Helium group gases, Gas ionization), Helium, Neon, Argon, Ions, Recombination reactions, Electron density, Glow discharges, Mass spectroscopy, Probes (Electromagnetic), Vacuum systems, Great Britain.

A description is given of work concerned with the measurement of the decay constants of the atomic ions He(+), Ne(+) and Ar(+) in their pure parent gases by monitoring the density of these species as a function of time in an afterglow using a time-resolving mass spectrometer and the decay of electron density in these pure gases using a Langmuir probe.

AD-608 496 Div. 2, 1, 20, 30
OTS Prices: HC $4.00/MF $0.75

Honeywell, Inc., Minneapolis, Minn.
ALPHA RADIATION HYGROMETER. VOLUME II. FROST-POINT HYGROMETER FOR W-47 AIRCRAFT.
Final rept. for 8 Jun 62-15 Jul 64,
by John E. Crowley and Ahmet F. Konar. 15 Aug 64, 96p
Contract AF19 604 8418, Proj. 6020, Task 602002
AFCRL 64 690 II

Unclassified report

See also AD-608 498.

Descriptors: (*Hygrometers, Dew point), (*Alpha particle detectors, Hygrometers), (*Aircraft, Meteorological instruments), Weather forecasting, Reconnaissance planes, Instrumentation, Air, Samplers, Electronic equipment, Installation, Test methods, Wind tunnels, Flight testing, Atmospheric sounding.

A frost-point hygrometer for use on W-47 aircraft has been designed utilizing alpha radiation techniques to measure the condensate thickness on cooled surfaces. A study of the problems associated with making frost-point measurements from high-speed aircraft was made as part of the design program. (Author)

AD-608 498 Div. 2, 20, 30
OTS Prices: HC $3.00/MF $0.75

Honeywell, Inc., Minneapolis, Minn.
ALPHA RADIATION HYGROMETER. VOLUME I. AUTOMATIC FROST-POINT HYGROMETER FOR STRATOSPHERIC WATER-VAPOR MEASUREMENTS.
Final rept. for 1 May 61-15 Jul 64,
by J. G. Ballinger, L. Kirvida, M. P. Fricke, and J. E. Crowley. 15 Aug 64, 53p
Contract AF19 604 8418, Proj. 6020, Task 602
AFCRL 64 690 I

Unclassified report

Descriptors: (*Hygrometers, Dew point), (*Water vapor, Stratosphere), (*Alpha particle detectors,

Hygrometers), Meteorological instruments, Humidity, Atmosphere, Measurement, Balloons, Flight testing, Wiring diagrams, Mechanical drawings, Photographs, Atmospheric sounding, Thermoelectricity, Servomechanisms.

This report describes a new type of automatic frost-point hygrometer for measurement of the atmospheric distribution of water vapor. The mass of the frost deposit on a cooled surface is detected directly by energy attenuation of alpha radiation. An automatic control maintains a constant amount of this frost by controlling the direction of current flow through a thermoelectric cooler. The instrumentation of this hygrometer is described in some detail, and balloon-flight tests of prototype units are presented. (Author)

AD-608 503 Div. 2, 20, 30
OTS Prices: HC $2.00/MF $0.50

Honeywell, Inc., Minneapolis, Minn.
ALPHA RADIATION HYGROMETER. VOLUME III: CURRENT PROBLEMS IN STRATOSPHERIC WATER-VAPOR MEASUREMENTS MADE WITH AUTOMATIC FROST-POINT HYGROMETERS.
Final rept. for 1 Jan 63-15 Jul 64,
by J. G. Ballinger, M. P. Fricke, and R. D. Murphy.
15 Aug 64, 33p
Contract AF19 604 8418, Proj. 6020, Task 602002
AFCRL 64 690 V3

Unclassified report

See also AD-608 496.

Descriptors: (*Hygrometers, Dew point), (*Water vapor, Stratosphere), (*Alpha particle detectors, Hygrometers), Meteorological instruments, Humidity, Atmosphere, Measurement, Reliability, Samplers, Contamination, Flight testing, Atmospheric sounding.

Two basic problems inherent in the stratospheric application f all automatic frost-point hygrometers are examined. In particular, instrument inadequacy due to low rates of mass transfer is found to be a highly probable explanation of the current controversy about upper-atmosphere water-vapor content. The second problem is that of contamination of the moist-air sample by water vapor desorbed from the instrument package and vehicle. The magnitude of this effect precludes a simple accommodation of low mass transfer rates by use of long sampling times. Measures to increase the reliability of future stratospheric data are recommended. (Author)

AD-608 513 Div. 2, 26
OTS Prices: HC $1.00/MF $0.50

Kaysam Corp. of America, Paterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541 ( )UM.
Quarterly progress rept. no. 10, 19 Jul-18 Oct 64,
by Frank Sterne. 18 Oct 64, 9p
Contract DA36 039SC85988

Unclassified report

Descriptors: (*Meteorological balloons, Manufacturing methods), Production, Industrial equipment, Conveyors, Quality control.

Progress of the pilot production run is reported. Performance of the assembly machine and drying conveyor is given.

AD-608 516 Div. 2, 8
OTS Prices: HC $1.00/MF $0.50

Center for Radiophysics and Space Research, Cornell Univ., Ithaca, N. Y.
MEASUREMENT OF SOLAR RADIO RADIATION AT 430 MEGACYCLES.
Quarterly status rept. for 1 Aug-31 Oct 64.
by M. H. Cohen. 17 Nov 64, 5p CRSR-185
Contract Nonr401 27

Unclassified report

Descriptors: (*Extraterrestrial radio waves, Sun), Ultrahigh frequency, Measurement, Polarization, Radio receivers, Audio amplifiers, Correlators, Antenna components, Phase shifters, Antennas, Moon, Radio signals, Radio astronomy, Antenna lobes, Signal-to-noise ratio.

An experiment was conducted to determine the state of polarization radiated by the Arecibo antenna, in both the main lobe and the first side lobe. The Arecibo antenna was set to 'linear' during this test, and was aimed at the moon. Echoes were received at Danby. The four successful runs required to complete the experiment were on August 5, August 29, September 3, and September 26, 1964. The Danby receiver has been used to monitor the sun for a few hours a day while it is near the meridian at Arecibo. The receiver is also being made ready for polarization measurements of solar bursts at 430 Mc. In preparation for the latter two pieces of equipment have been built: a correlator and an audio amplifier with a 90 degree phase shifter.

AD-608 521 Div. 2, 8, 25
OTS Prices: HC $3.00/MF $0.75

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ELECTROMAGNETIC ABSORPTION EFFECTS IN PLASMA SPHERES.
Final rept.,
by N. E. Pedersen and J. Davis. 25 Nov 64, 81p
RAD-TR-64-37
Contract AF19 628 3309, Proj. 4600, Task 460004
AFCRL 64 805

Unclassified report

Descriptors: (*Lightning, Plasma physics), (*Plasma medium, Spheres), Electromagnetic waves, Absorption, Resonance, Electric moments, Dipole moments, Argon, Gas ionization, Thermodynamics, Electrostatics.

A set of equations is developed describing the steady state thermodynamics of a homogeneous plasma sphere for electromagnetic plane wave absorption in the case of electric dipole absorption resonance. The thermodynamic properties of the system are obtained by coupling a modified Saha equation with the electromagnetic resonance conditions for maximum power absorption. The main results of this analysis are graphically illustrated for the case of a partially ionized argon plasma. Also included are regions of validity for which such a system is compatible with the electromagnetic resonance conditions as well as with the fundamental limitations imposed by the physics of the problem. In fact, it is shown that the plasma sphere radius is restricted to values less than 5 cm (order of magnitude) and an incident angular frequency of greater than 10 to the 10th power/sec. The gas temperature increases as frequency increases, and the radius decreases with increasing frequency. With these restrictions as well as the associated bounds on the other thermodynamic parameters, it seems highly improbable that one can sustain plasma spheres of significant size for the case of resonance absorption. (Author)

AD-608 533 Div. 2
OTS Prices: HC $3.00/MF $0.75

Centre National de Recherches de l'Espace, Brussels

(Belgium).
AERONOMIC PROCESSES IN THE IONOSPHERE.
Final rept.,
by William Swider, Jr. 30 Sep 64, 85p
Contract AF61 052 748
CNRE 14; AFCRL 64 899

Unclassified report

Descriptors: (*Ionosphere, Chemical reactions), Twilight, Night sky, Optical properties, Ionization, Ions, Electrons, Decay schemes, Dissociation, Recombination reactions, Solar radiation, Nitrogen, Reaction kinetics.

The approximate variation of the solar flux over the solar cycle is discussed. It is shown that at twilight the variation of the atmosphere over a solar cycle becomes more important than the variation of the solar flux in determining ionic production. The variation of the solar flux being more important for an overhead sun. Practical solutions for the optical depth of the terrestrial ionosphere are given. The nighttime ionosphere is described in terms of stationary decay schemes. Various explanations are brought forth for the nighttime E-region which appears to be the only section of the nighttime ionosphere which departs from stationary decay. The twilight ionosphere is discussed briefly in terms of the behavior of N+2 ions. Departures from photoequilibrium are determined. It is noted that the twilight ionosphere is an ionosphere which involves the maximum departure from photoequilibrium. Considering all possible factors, but neglecting sporadic effects, it is shown that uncertainties in reaction rate coefficients remain the major physical ionospheric problem. Approximate ranges for some the important rates are suggested. The temperature dependence of dissociative recombination, a key problem, is also discussed. (Author)

AD-608 538 Div. 2
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
COLOR EXCESSES IN SIX LUNAR CRATERS ACCORDING TO ELECTROPHOTOMETRIC OBSERVATIONS,
by K. I. Kozlova, and Yu. V. Glagolebskii.
23 Oct 64, 7p
RSIC 313; TT 65 60135

Unclassified report

Trans. of Astronomicheskii Tsirkulyar (USSR) 1958, no. 198, p. 1-2.

Descriptors: (*Moon, Colors), Optical analysis, Photometers, Electrometers, Astronomical data, USSR.

Lunar observations were conducted by means of an A3T-7 telescope in the city of Alma-Ata with the help of an electrophotometer. Observations were conducted during a full moon for the purpose of reducing the effect of polarization to a minimum. Observations were conducted on August 31 and September 1, 26, 27, 28 and 29 of 1958. Photometry was performed on the bottoms of 6 craters through two light filters, yellow and blue. Crater Manillius was chosen as the base for comparison. All the bottoms of craters observed were compared with it. The diameter of the aperture which defined the photometric regions was equal to approximately 3/4 the diameter of Manillius. All craters and the base regions were measured 10 times through each filter. Photometry of the base region was conducted immediately following that of each crater. Measurements of the base region and of each crater were taken several times in the course of the night. An average for each crater was taken as the result of the whole series of observations.

AD-608 547 Div. 2
OTS Prices: HC $1.00/MF $0.50

Manchester Univ. (England).
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE. OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 Mc/s.
Progress rept. no. 3, Apr-Jun 64,
by Conrad H. Slater, C. G. T. Haslam, and M. J. S. Quigley. Jun 64, 7p
Contract N62558 3928

Unclassified report

See also AD-606 503.

Descriptors: (*Stars, Position finding), (*Radio astronomy, Position finding), Galaxies, Extraterrestrial radio waves, Ultrahigh frequency, Stellar eclipses, Moon, Brightness, Emissivity, Astronomical data, Radio equipment.

AD-608 550 Div. 2, 25
OTS Prices: HC $2.00/MF $0.50

Weizmann Inst., Rehovoth (Israel).
PROPAGATION OF A COMPRESSIONAL PULSE IN A LAYERED SOLID.
Technical note no. 10,
by C. L. Pekeris, Z. Alterman, F. Abramovici, and H. Jarosch. 10 Oct 64, 41p
Contract AF61 052 509
AFCRL 64 878

Unclassified report

See also AD-280 057.

Descriptors: (*Seismic waves, Propagation), (*Mechanical waves, Propagation), Seismographs, Solids, Power series, Israel.

A solution is given for the problem of propagation of a compressional pulse in a solid half-space which is overlain by a solid layer of different properties. The point source is situated at the depth 1/2H, H denoting the thickness of the layer. Theoretical seismograms of the vertical displacement w at the surface are evaluated out to ranges r = 20H. The solution is obtained by the exact ray theory. The displacement due to the source was assumed to have a shape which at large distances reduces to a saw-tooth. The once-reflected waves from the interface, PP and PS, are strongly marked. The Rayleigh wave is already recognizable at r =5H, and is fully developed at r =20H. The method of ray theory is applied far into the region where the normal mode theory converges well. (Author)

AD-608 559 Div. 2, 4, 12, 13
OTS Prices: HC $5.00/MF $1.00

Little (Arthur D.), Inc., Cambridge, Mass.
RESEARCH DIRECTED TOWARD THE STUDY OF HEAT TRANSFER IN COMPLEX ROCK SYSTEMS.
Final rept.
by A. E. Wechsler and P. E. Glaser. Sep 64, 144p
Contract AF19 628 3279, Proj. 0000
AFCRL 64 738

Unclassified report

Descriptors: (*Lunar environment, Water supplies), (*Water supplies, Lunar environment), (*Rock (Geology), Water supplies), Simulation, Scientific research, Heat transfer, Processing, Hydrates, Minerals, Physical properties, Mechanical properties, Thermal properties, Underground explosions, Nuclear explosions, Mathematical models, Design, Chemical engineering.

This study is part of a program conducted by the Air Force Cambridge Research Laboratories on methods of

detection and utilization of lunar water resources. The two principal objectives of this study were: 1. To aid in the assessment of lunar water extraction processes by obtaining data on the physical, thermal and mechanical properties of hydrated minerals and rock systems, and 2. To analyze the heat and mass transfer associated with several possible lunar water extraction processes, using data obtained from literature and from experimental studies. Particular emphasis was to be placed on heat transfer and control in fractured and unfractured rock systems containing hydrated minerals. Literature data on the density, thermal conductivity, specific heat, permeability, porosity, thermal diffusivity, and moisture content of rock systems are assembled and tabulated. Experimental data for six typical rocks were obtained and compared to literature data. The apparatus and methods used in the experimental program are described. The results of calculations of the heat and mass transfer associated with extraction of water from subsurface deposits and mined deposits are presented. (Author)

AD-608 561 Div. 2, 9
OTS Prices: HC $1.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md.
ROSSBY WAVES IN A BAROCLINIC, COMPRESSIBLE ATMOSPHERE.
Technical rept. nos. 19 and 22,
by Robert R. Long. Nov 64, 17p
Contracts Nonr4010 01, CWB10917, Proj. NR082 104
Unclassified report

Descriptors: (*Atmospheric motion, Mathematical models), (*Fluid mechanics, Atmospheric motion), Differential equations, Atmosphere, Incompressible flow, Compressible flow, Coriolis effect, Barometric pressure, Meteorology.

A differential equation governing the motion of large-scale disturbances is solved for steady, finite disturbances in a uniform basic current, and the results are compared with finite-amplitude Rossby waves in an incompressible, homogeneous fluid. It is found that if the vertical velocities are identically zero, neither the baroclinicity nor the compressibility has any effect. When vertical motion is allowed, the speed of the waves is strongly affected by the baroclinicity but quite unaffected by the compressibility. The wave speed relative to the resting fluid is about twenty-five percent less than the Rossby wave speed when the vertical velocity is of one sign along a vertical. The problem is solved completely in two cases, an incompressible atmosphere, and a fluid with compressibility properties similar to those of air. Both compressibility and baroclinicity have important quantitative effects.

AD-608 596 Div. 2
OTS Prices: HC $7.45/MF $2.25

Illinois Inst. of Tech., Chicago.
SHOCK INDUCED STRESS WAVE PROPAGATION IN SAND.
Doctoral thesis,
by Ernest Theodore Selig. Jan 64, 444p
Unclassified report

Supported by a grant from the National Science Foundation, Washington, D. C.

Descriptors: (*Sand, Mechanical waves), (*Mechanical waves, Sand), (*Soil mechanics, Stresses), Shock (Mechanics), Propagation, Shock waves, Strain (Mechanics), Meters, Design, Loading (Mechanics), Attenuation.

A study has been made to determine the characteristics of shock induced stress wave propagation in horizontal columns of dry sand confined under constant lateral pressure. The results of experiments in which stress-time histories were measured at several positions along the column were compared to calculated values based upon a nonlinear, inelastic theory of wave propagation. The theoretical results depend primarily upon the assumed stress-stain characteristics for the soil. The stress-strain characteristics considered in the analysis were based upon static stress-strain measurement, taking into account the effects of repeated loading. The modification of the static response by viscous effects and lateral inertia was also considered. The most difficult part of the experimental program was the accurate measurement of stress in the sand column. To accomplish this objective a development effort was undertaken as part of this research to obtain suitable gages and techniques for their use.

AD-608 597 Div. 2
OTS Prices: HC $3.00/MF $0.75

Aeronautical Chart and Information Center, St. Louis, Mo.
CLASSICAL METHODS FOR REDUCTION OF GRAVITY OBSERVATIONS.
Reference pub.,
by Donald M. Scheibe and Harold W. Howard. Apr 64, 92p
ACIC RP12
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gravity, Mathematical analysis), (*Isostatic change, Mathematical analysis), Numerical methods and procedures, Geophysics, Geodesics, Data, Reduction, Tables, Maps.

There are many methods for the reduction of gravity observations, each with its limitations. This report discusses the most popular classical reductions, viz., free-air, condensation, inversion, Bouguer, and isostatic, to develop a background of theoretical knowledge. The procedures for the reduction of gravity measurements and the determination of anomalies using the free-air, Bouguer and Airy-Heiskanen isostatic techniques are presented. (Author)

AD-608 622 Div. 2
OTS Prices: HC $3.00/MF $0.75

Marine Lab., Univ. of Miami, Coral Gables, Fla.
RADAR HURRICANE RESEARCH.
Final rept. for 1 Sep 63-1 Aug 64,
by H. V. Senn and J. A. Stevens. Aug 64, 82p
ML(UM)-8834-1, M.-64314
Contract Cwb10755
Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Hurricane tracking, Meteorological radar), (*Meteorological radar, Hurricane tracking), Weather forecasting, Tropical cyclones, Meteorology, Scientific research, Radar reflections, Phase distortion, Phase measurements.

The small-scale motion of radar hurricane echoes in Donna 1960 were studied in great detail. The echo speeds were found to vary sinusoidally with time, the oscillations exhibiting an r2 sub 5 squared phase lag with range, corresponding to a disturbance speed which varied as 1/r sub S. The echo crossing angles experience

the same oscillations, with phase lag r sub 5 to 1/2 power. The differences in echo motion inside and outside of spiral bands were studied. A number of cases of spiral-band and squall-line motion were studied and their motion related to hurricane movement, yielding a possible method of predicting the motion of hurricanes when squall-lines are visible on radar. A particular solution to the static temperature equation, which was correlated with spiral bands, was obtained for the case of the hurricane assuming a correspondence between the spiral bands and the minimum temperatures in the hurricane. A survey of airborne hurricane reconnaissance tracking problems and accuracies is also presented, including recommendations for improving the radar position data in the future. An observation of a precipitation-free radar sea-breeze front or thin band which became a part of a hurricane Ginny spiral band is included in the Appendix. (Author)

AD-608 627 Div. 2
OTS Prices: HC $4.00/MF $0.75

Travelers Research Center, Inc., Hartford, Conn.
FURTHER INVESTIGATIONS OF NUMERICAL MODELS OF THE ATMOSPHERE BOUNDARY LAYER.
Final rept.,
by Joseph P. Pandolfo, Duane S. Cooley, and Marshall A. Atwater. Jul 64, 110p TRC-7458-126
Contract Cwb10682

Unclassified report

Descriptors: (*Atmosphere models, Boundary layer), (*Boundary layer, Atmosphere models), Mathematical models, Diffusion, Heat transfer, Heat transfer coefficients, Water vapor, Atmospheric motion, Micrometeorology, Numerical methods and procedures, Programming (Computers), Experimental data.

In an extension of the work described in a previous report 13 TRC-7047-80 , a combined diffusion-surface heat balance model for the atmospheric planetary boundary layer has been programmed for numerical integration, and has undergone preliminary testing with data from seven six-hour test periods selected from the Great Plains observational program. The tests show that the inclusion of the surface heat exchange process eliminates the necessity for prespecification of a lower boundary temperature in order to obtain realistic predictions of temperature and wind trends in the presence of cloudiness. Some modifications of the present modeled maximum and minimum values of exchange coefficient are suggested by the results. Model equations for the computation of radiative flux divergence effects in the presence of boundary layer clouds have also been derived, and detailed specifications for the computer program prepared. Equations for the computation of the mean vertical velocity and three-dimensional advective change have been derived. The specifications for the computer program assume that the advection process is characterized by longer time periods of variation than the other modeled processes. (Author)

AD-608 628 Div. 2
OTS Prices: HC $3.00/MF $0.75

Travelers Research Center, Inc., Hartford, Conn.
FURTHER INVESTIGATIONS OF NUMERICAL MODELS OF THE ATMOSPHERE BOUNDARY LAYER; SUPPLEMENT. PROGRAM DESCRIPTIONS.
Final rept., suppl.,
by Gerald C. Wickham and Marshall A. Atwater.
Jul 64, 99p TRC-7458-126A, TRC-7458-126, suppl.
Contract Cwb10682
AD 608 627, suppl.

Unclassified report

See also AD-608 628.

Descriptors: (*Atmosphere models, Boundary layer), (*Boundary layer, Atmosphere models), (*Programming (Computers), Micrometeorology), Mathematical models, Atmosphere, Thermodynamics, Data processing systems, Meteorology.

The programs discussed in this write-up are an extension and integration of the programs developed under the U. S. Weather Bureau contract Cwb-10368. The Heat Balance and the Diffusion Model Programs of that report have been combined to run as one program, which will be referred to as Merge I in this report, from data supplied on magnetic tape and punched cards. The Data Generation Program generates on tape six hours of data for diffusion model equations with one minute time steps and the data input necessary for the heat balance equations. The tape is input to Merge I, as the cards produced by the Data Generation Program were input to the Diffusion Model Program.

AD-608 634 Div. 2, 28, 32
OTS Prices: HC $3.00/MF $0.50

Northwestern Univ., Evanston, Ill.
A SIMULATION STUDY OF BARRIER EFFECTS IN SPATIAL DIFFUSION PROBLEMS.
Technical rept. no. 1,
by Robert S. Yuill. Nov 64, 52p
Contract Nonr1228 33, Task 389 140

Unclassified report

Descriptors: (*Geography, Social psychology), (*Social communication, Geography), Monte Carlo method, Simulation, Programming (Computers), Diffusion, Terrain, Ecology, Permeability, Time, Urban areas, Probability, Social sciences, Sociology, Equations, Programming languages.

A computer simulation study was made of the role of barriers in structuring human activity patterns in space. Certain abstract barrier situations were investigated using Monte Carlo simulation in the context of spatial diffusion problems. Within this framework the effects of shape and function of barriers were examined, and results indicated that (1) shape is the most important characteristic of a barrier, (2) the spatial range of a barrier is determined by the mean information field of the individual or unit element of the activity under consideration, and (3) time was found to be an essential part of both the spatial movement and its measurement. Drawing upon these results, two simple theoretical models of barrier situations were constructed and compared with their real world counterparts. The degree of correspondence indicates that this approach promises to develop into a fruitful line of inquiry. (Author)

AD-608 640 Div. 2
OTS Prices: HC $2.00/MF $0.50

Marine Lab., Univ. of Miami, Coral Gables, Fla.
INVESTIGATIONS OF AMERICAN TROPICAL AND SUBTROPICAL SEAS.
Progress rept. for 1 Jun 63-31 May 64,
comp. by F. F. Koczy. 31 May 64, 40p
ML(UM)-64-4, ML(UM)-8260
Contract Nonr4008 02

Unclassified report

Descriptors: (*Oceanology, Tropical regions), (*Tropical regions, Oceanology), Oceanographic equipment, Geochemistry, Marine geology, Marine biology, Ocean bottom topography, Atlantic Ocean, Oceanographic data, Data processing systems.

The investigation consisted of a common serial observation program for temperature, salinity, oxygen, inorganic phosphate-phosphorous, oblique plankton tows, carbon-14, light and microbiomass measurements, nightlight stations and bathymetry in the area from Nassau to Dakar between 15 degrees N and 15 degrees S along 20 degrees W; from 15 degrees S to Recife; from Recife to 2 degrees S-17 degrees W; and from 2 degrees N - 17 degrees W to Dakar.

AD-608 643 Div. 2
OTS Prices: HC $1.00/MF $0.50

Manchester Univ. (England).
THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO STARS BY THE LUNAR OCCULTATION TECHNIQUE AND OBSERVATIONS OF GALACTIC AND EXTRA-GALACTIC EMISSION AT 408 Mc/s.
Progress rept. no. 4, Jul-Sep 64,
by Conrad H. Slater, C. G. T. Haslam, and M. J. S. Quigley. Sep 64, 10p
Contract N62558 3928
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-608 547.

Descriptors: (*Stars, Position finding), (*Radio astronomy, Position finding), Extraterrestrial radio waves, Ultrahigh frequency, Stellar eclipses, Supernovae, X rays, Astronomical data, Data processing systems, Astrophysics.

AD-608 668 Div. 2, 8
OTS Prices: HC $2.00/MF $0.50

Technische Hochschule, Munich (West Germany),
ELF INVESTIGATIONS.
Final rept. no. 1, 1 Apr 62-30 Jun 64,
by H. L. Konig. 30 Jun 64, 36p
Contract AF61 052 603
AFCRL 64 759
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Extremely low frequency, Atmospherics), (*Atmospherics, Extremely low frequency), (*Terrestrial magnetism, Oscillation), Electromagnetic waves, Propagation, Magnetic fields, Electric fields, Radiofrequency interference, Solar flares, Measurement, Rhode Island, West Germany, Time signals, Calibration, Geophysics, Electronics.

Two observation stations, seperated in the East-West direction by approximately 3750 miles, the one near Munich, Germany, and the other near Kingston, R. I., USA, are being used to simultaneously observe the fluctuations of the Earth magnetic field in the frequency region around 10 cps. On 5 of 23 testdays a total of 10 cases were noted where waveforms began within 0.1 seconds of each other at both stations. (Author)

AD-608 675 Div. 2
OTS Prices: HC $3.00/MF $0.75

Washington Univ., Seattle.
ANNUAL REPORT. RESEARCH PROGRAMS IN RADIATION, SEA ICE PHYSICS, ATMOSPHERIC CHEMISTRY, THE PHYSICS OF WIND-BLOWN SNOW, AND SOIL TEMPERATURE .
Rept. for 1 Dec 63-1 Dec 64,
by Phil E. Church. 1 Dec 64, 65p
Contract Nonr477 24, Proj. NR307 252
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solar radiation, Arctic regions), (*Ice islands, Arctic regions), (*Meteorology, Arctic regions), (*Soil mechanics, Arctic regions), (*Arctic regions, Geophysics), Scientific research, Reports, Atmosphere, Chemical properties, Snow, Wind, Transport properties, Soils, Temperature, Tables.

Investigations were conducted at the facilities of the Arctic Research Laboratory near Pt. Barrow, Alaska, on drifting stations ARLIS II and ARLIS III, and at the University of Washington.

AD-608 676 Div. 2, 20, 25
OTS Prices: HC $1.00/MF $0.50

Weidlinger (Paul), New York.
ATTENUATION OF STRESS WAVES IN BI-LINEAR MATERIALS,
by Richard Skalak. Oct 60, 25p
Contract AF29 601 2855, Proj. 1080
AFSWC TN60 30
Unclassified report

Descriptors: (*Soils, Compressive properties), (*Mechanical waves, Attenuation), (*Stresses, Numerical analysis), Strain mechanics, Loading (Mechanics), Porous materials, Nuclear explosions, Blast, Pressure.

The attenuation of plane stress waves generated by a decaying surface pressure in a bi-linear medium is investigated, to obtain an approximate solution to the problem of a medium with a stress strain diagram of positive curvature. Wave equations are derived, and it is demonstrated that, beyond a given distance from the surface, the intensity of the peak stress and particle velocity depends only on a single parameter. This result is of significance in establishing the relevant physical characteristics of granular soils which are subjected to very high intensity nuclear surface blast pressures. (Author)

AD-608 700 Div. 2
OTS Prices: HC $1.00/MF $0.50

High Altitude Observatory, Boulder, Colo.
REPORT ON SOME SOLAR RESEARCH AND INSTRUMENTATION PROGRAMS AT SACRAMENTO PEAK OBSERVATORY AND HIGH ALTITUDE OBSERVATORY.
Final rept. for 1 Apr 60-30 Jun 64,
by John W. Firor and Robert L. Shutt. 28 Sep 64, 23p
Contract AF19 604 6664, Proj. 7649, Task 764902
AFCRL 64 857
Unclassified report

Prepared in cooperation of Sacramento Peak Observatory, Sunspot, N. Mex.

Descriptors: (*Astronomical observatories, Instrumentation), (*Astronomical data, Scientific research), High altitude, Solar eclipses, New Guinea, Solar corona, Solar atmosphere, Solar spectrum, Sunspots, Astronomy.

A summary of research performed at Sacramento Peak Observatory and High Altitude Observatory is given. The contract primarily supported instrumentation at Sacramento Peak Observatory and several solar research programs

at both Sacramento Peak and High Altitude Observatory, including observation of the total solar eclipse at Lae, New Guinea on 5 February 1962. (Author)

AD-608 706 Div. 2, 25, 30
OTS Prices: HC $3.00/MF $0.75

Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins Univ., Baltimore, Md.
BAL-AST, BALLOON-ASTRONOMY PROGRAM AT THE JOHNS HOPKINS UNIVERSITY.
Final rept. for 1 Aug 61-31 Jul 64,
by John Strong. 1 Aug 64, 74p
Contracts AF19 628 202, Nonr248 52, Proj. 8602, Task 860205
AFCRL 64 825

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Astronomy, Tracking telescopes), (*Balloons, Astronomy), Water, Planetary atmospheres, Venus, Scientific research, Airborne, Telescopes, Star trackers, Ground support equipment, Optical equipment, Infrared equipment, Infrared research.

Water in the atmosphere of Venus, discovered by Moore and Ross in November 1959 with a balloon-telescope system provided under prior support, was confirmed and measured far more precisely in February 1964 with an automatic unmanned system provided by the subject contract. These scientific results are presented. The original telescope system, and the automatic one into which it was transformed under the subject contract, are described. The optical and instrumental developments that have made automatic balloon astronomy feasible are described. A new balloon launching procedure is described. Work planned for the future is mentioned, including a ground-based use for the new telescope. (Author)

AD-608 730 Div. 2
OTS Prices: HC $1.00/MF $0.50

Michigan Univ., Ann Arbor.
BASIC SOLAR RESEARCH.
Annual rept. for 1 Oct 63-1 Oct 64,
by O. C. Mohler. 1 Oct 64, 10p
Nonr122419, Proj. NR013 205

Unclassified report

Rept. on Proj. VELA.

Descriptors: (*Sun, Scientific research), (*Solar flares, Measurement), Solar systems, Solar spectrum, Solar disturbances, Terrestrial magnetism, Cosmic rays, Sunspots, Iron, Spectroscopy, Astronomical observatories.

Research at McMath-Hulbert Observatory during the period Oct. 1, 1963-Sept. 30, 1964, on solar flares, solar activity and solar terrestrial relationships on the following is reviewed: Initial survey and organization of spectro-heliographic records of solar activity, 1958-1961; analysis of wavelength-sweep records for July 16, 1959, and June 25, 1960; working list of flares and daily flare index for 1963; general relationships between flares, ionospheric, and geomagnetic disturbances for 1957-1961; solar activity at start and end of first six months of the International Years of the Quiet Sun; unexpected effect related to 29.5 days in cosmic ray data; magnetic fields of large sunspots; magnetic classification of sunspots in the Mount Wilson system, 1963-64; application of hydromagnetic theory to the sun; decrease in intensity at the solar limb during the July 20, 1963 eclipse; profiles of weak iron lines; measurement for various groups of lines in the solar spectrum; relative abundances of chemical elements in the solar atmosphere.

AD-608 731 Div. 2, 13
OTS Prices: HC $3.00/MF $0.75

Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
FOUR TOPICS PERTINENT TO SEDIMENT TRANSPORT AND SCOUR.
Technical rept. no. 3,
by M. R. Carstens and C. S. Martin. Sep 63, 78p
Contract NObs84237, Projs. SF011 02 12, A628, Task 2553

Unclassified report

Descriptors: (*Ocean bottom, Erosion), (*Erosion, Transport properties), (*Water waves, Transport properties), Sand, Oscillation, Boundary layer, Laminar flow, Turbulence, Porous materials, Permeability, Cylindrical bodies, Jets, Hydrology, Model tests.

Four subjects which are of interest in sediment transport and scour studies are discussed. They are (1) transition of oscillatory boundary-layer flow, (2) the effect of uplift on incipient motion of bed particles, (3) a theoretical and experimental investigation of flow under a partially-imbedded cylinder, and (4) scour.

AD-608 744 Div. 2
OTS Prices: HC $4.00/MF $0.75

National Engineering Science Co., Pasadena, Calif.
WAVE SHOALING,
by B. J. LeMehaute and L. M. Webb. Apr 64,
105p SN-134-2
Contract Nonr4177 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Water waves, Mathematical analysis), (*Beaches, Mathematical analysis), Nomographs, Ocean currents, Theory, Tides, Ocean waves, Tables, Seacoast, Configuration, Ocean bottom, Wind.

The concepts of energy flux and group velocity for nonlinear periodic gravity waves are discussed. The average energy flux, average energy per wavelength and 'group velocity' are calculated for irrotational periodic gravity waves at a third order of approximation. Then the principle of conservation of transmitted energy between wave orthogonals is applied to the same order of approximation for determining the variation of wave height in decreasing depth. The results are presented as nomographs. It is seen that the 'shoaling coefficient' needs to be expressed at least at a third order of approximation to account for experimental results. The second part of the report is the summary of a literature survey which has been carried out on the problem of littoral processes. It is now possible to make further refinements to the material presented in progress report SN 134-1 on waves arriving at an angle with the shoreline. Also the way is paved for applying the theoretical results, already obtained in SN 134, to the problem of littoral processes.

AD-608 759 Div. 2
OTS Prices: HC $2.00/MF $0.50

Ionosphere Research Lab., Pennsylvania State Univ., University Park.
EFFECT OF TEMPERATURE CHANGES ON THE ELECTRON DENSITY DISTRIBUTION IN THE F-REGION.
Scientific rept.,

by Y. V. Somayajulu. 1 Dec 64, 27p IRL-226
Contract AF19 628 4014, Grant NSF GP2914,
Proj. 8605, Task 860502
AFCRL 64 853

Unclassified report

See also AD-414 516.

Descriptors: (*Ionosphere, Electron density), Diurnal variations, Ionospheric disturbances, Tropical regions, Temperature, Deformation.

The initial profile is assumed to correspond to photo-equilibrium conditions, with the peak electron density determined by production, loss and diffusion. The temperature dependence of the production, loss and diffusion parameters are then introduced and the modified profiles are obtained for different temperature changes. The results show that following a temperature increase (by a factor lambda > 1) the electron density at all levels decreases. The height of the peak is located using the theoretical expression. The changed peak electron density obtained from the profile agrees well with that computed from the theoretical expression. Thus, it is concluded that the changed electron density distribution up to the peak can be obtained using this procedure. It is, however, pointed at that while a large reduction takes place in the electron density at fixed levels, the N (max) decreases only as approximately 1/lambda (5/6th or 1/2 powers). For small changes in temperature (lambda=1.1) there is a possibility of a slight increase in N (max). Similarity between these results and the behavior of F-region in the equatorial regions is indicated. (Author)

AD-608 767 Div. 2
OTS Prices: HC $1.00/MF $0.50

Chicago Univ., Ill. Fluid Dynamics and Sediment Transport Lab.
THE INTERNAL VELOCITY FIELD IN BREAKING WAVES.
Technical rept. no. 1,
by R. L. Miller and J. M. Zeigler. Nov 64, 22p
Contract Nonr212126

Unclassified report

Prepared for presentation at the Conference on Coastal Engineering (9th), National Council for Wave Research, Lisbon (Portugal), 1964.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ocean waves, Velocity), (*Oceanographic data, Ocean waves), Measurement, Fluid flow, Fluid dynamic properties, Analysis.

The results are presented of detailed measurements of the horizontal velocity component inside breaking waves. In the course of the experiment, a series of measurements was made very close to the shore. During one tidal cycle, the instruments became exposed to breakers and continued to operate. A study of the resulting data convinced us that detailed velocity measurements could be made within the natural breaker in the field. Accordingly, a series of runs was made and velocity data collected on breakers ranging from very small to storm size. This data is presented and discussed in detail.

AD-608 773 Div. 2
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
STUDIES OF THE CLIMATOLOGY OF WINDS, TEMPERATURE, AND TURBULENCE IN JET STREAMS.
Final rept.,
by R. M. Endlich and G. S. McLean. Oct 64, 71p
Contract AF19 628 3304, Projs. 8624, 4689, Task 862402
AFCRL 64 834

Unclassified report

Descriptors: (*Jet streams (Meteorology), Climatology), (*Climatology, Jet streams (Meteorology)), Atmospheric temperature, Atmospheric motion, Turbulence, Wind, Numerical methods and procedures, Statistical functions, Meteorology, Reports.

This report consists of three separate papers concerned with the climatology of jet streams and clear-air turbulence. The first paper is entitled 'Jet-Stream Structure over the Central United States Determined from Aircraft Observations.' In this study, empirical models of jet streams are found to agree well with previous models based on data from other regions of the mid-latitudes. Also, we found that variations in the speed field with season and with position in the upper flow pattern were rather small, so that a single model describes the jet stream adequately. The second paper is entitled 'Empirical Relationships Between Gust Intensity in Clear-Air Turbulence and Certain Meteorological Quantities.' This paper provides data of a type that has not been available previously, having applications to aircraft and missile design, and to the determination of world-wide turbulence statistics. The third paper is entitled 'Some Autocorrelations and Spectra of Wind and Temperature in Jet Streams.' Correlations were computed for paths oriented across jet streams and along jet streams. In all cases, the autocorrelations decreased to zero within 25 to 40 percent of the path length, indicating that the distance considered (length of the data sample) is important in determining the shape of the autocorrelation function. Spectral computations showed that only a small portion of the variance lies in the mesoscale range--i.e., in wavelengths smaller than approximately 200 nm. (Author)

AD-608 779 Div. 2
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
HOURLY RAWINSONDES FOR A WEEK (PART II).
Special reports,
by Arnold A. Barnes, Jr. and Henry A. Salmela.
Nov 64, 19p
Proj. 8628
AFCRL 64 886; AFCRL SR10 Unclassified report

See also AD-273 303.

Descriptors: (*Radiosondes, Balloons), (*Meteorological parameters, Atmospheric sounding), (*Atmospheric sounding, Meteorological parameters), Wind, Atmospheric temperature, Humidity, Barometric pressure, Punched cards.

During the first seven days of April 1960 hourly rawinsonde runs were made at Bedford, Mass. This paper describes in detail the data-heights, temperatures, relative humidities and U, V components of the wind as given on IBM punch cards. The data is tabulated in two forms. In the first form thirty pressure levels from 1000 mb to 10 mb are used. In the second form, the position of the balloon is given for each minute of flight. Information on obtaining the IBM punch cards is included. (Author)

AD-608 784 Div. 2, 20
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.

ELECTRON AND PROTON FLUXES IN THE TRAPPED RADIATION BELTS ORIGINATING FROM AN ORBITING NUCLEAR REACTOR.
Air Force Surveys in Geophysics,
by John C. Ringle, Ludwig Katz, and Don F. Smart.
Oct 64, 33p
Proj. 8600
AFCRL 64 865; AFCRL AFSG159
Unclassified report

Descriptors: (*Artificial radioactivity, Space environmental conditions), (*Neutron activation, Space environmental conditions), Orbital trajectories, Nuclear reactors, Electrons, Protons, Van Allen radiation belt, Measurement, Geophysics.

A simple calculation is done to determine the effects of an orbiting nuclear reactor on the trapped radiation belts. A SNAP-50 reactor, in an equatorial orbit at 1000 km and operating at 8 megw/thrm for a period of one year, is considered as a source of low energy electrons and protons. Neutrons escaping from the reactor decay into electrons and protons and these can become trapped in the earth's magnetic field. Hence, they contribute to the natural fluxes in the radiation belts. Three different source problems are considered: 1.) those neutrons which decay within one kilometer of the reactor; 2.) those neutrons which decay within the entire inner radiation belt; 3.) those neutrons which decay within the entire outer radiation belt. In each region the average equilibrium of reactor-produced electron and proton fluxes at the equator are calculated after reactor operation for one year. These fluxes are compared to the average natural electron and proton fluxes in the regions, and the reactor-produced fluxes are found to be less than 0.1 percent of the natural fluxes in all three cases. All assumptions and calculations are presented in sufficient detail to allow updating with more recent or more exact information. (Author)

AD-608 811 Div. 2
OTS Prices: HC $3.00/MF $0.75

Woods Hole Oceanographic Institution, Mass.
ATLANTIC OCEANOGRAPHY.
Periodic status rept. for 1 Jul 63-30 Jun 64,
comp. by J. H. Stanbrough. Sep 64, 66p
WHOI-Ref-64-42
Contract Nonr219600, Proj. NR083 004
Unclassified report

Descriptors: (*Oceanology, Atlantic Ocean), (*Atlantic Ocean, Oceanology), Oceanographic data, Ocean currents, Marine geology, Geochemistry.

Contents: Physical oceanography (North Atlantic circulation, the Gulf stream, Gulf stream transport, deep current measurements, equatorial current system, Mediterranean Sea, internal waves, drift measurements, swallow floats, analysis of moored ocean current meter data, forecast of winter temperatures, salinity measurements, Atlantic thermohaline data); Oceanic physics (hydrodynamics of rotating fluids, buoyant convection, laboratory model experiments, marine physical geodesy); Applied oceanography (telemetry of ocean temperatures, buoy telemetry, underwater photography); Biological oceanography (nutrient chemistry, physiological studies); Geo-chemical oceanography (organic geochemistry, sedimentary geology, coastal geology); Ship and aircraft use.

AD-608 820 Div. 2, 30
OTS Prices: HC $3.00/MF $0.75

David Sarnoff Research Center, Princeton, N. J.
AN ANALYSIS OF FACTORS LIMITING SEISMIC DETECTOR SENSITIVITY.
Final rept. for 15 Jun 61-15 Oct 64.
15 Oct 64, 55p
Contract AF49 638 1080, ARPA Order 292 63, Am. 4
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-401 051.

Descriptors: (*Seismic waves, Monitors), (*Seismographs, Sensitivity), Microseisms, Noise (Radio), Noise analyzers, Noise generators, Signal-to-noise ratio, Amplifiers, Signals, Gain, Analysis.

Contents:
Introduction
Summary of work to date
Amplifier noise measurements
Coupling seismometers and amplifiers for maximum signal to noise ratio
Signal to noise ratios for several seismometer-amplifier combinations
Visual detection of signal in the presence of noise.

AD-608 824 Div. 2
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
RELATIVISTIC GALACTIC MORPHOLOGY I: GENERAL THEORY,
by Dominic G. B. Edelen. Dec 64, 98p RM-4017-RC
Unclassified report

Descriptors: (*Galaxies, Relativity theory), (*Relativity theory, Galaxies), Mathematical models, Geometric forms, Celestial mechanics, Gravity, Field theory, Surfaces, Tensor analysis, Conformal mapping, Algebraic topology.

A class C of kinematical models of galactic structures is constructed under the assumption that a galaxy has a definite physical boundary that is geometrically stable with respect to the Einstein gravitational field. After a somewhat lengthy calculation involving intrinsic rest coordinates and conformally related intrinsic surface geometries, it is shown that the discretization equation can be written as if it applied to a two-surface immersed in a Euclidean three-space, provided the eccentricity is assumed to be constant. If these results are combined with those obtained from considerations of general quadrics in a number of different spaces, it can be shown that the equilibrium contours of galaxies can be predicted. The predicted shapes obtained in this way provide a detailed morphological classification for the ellipticals and possibly for the SO's. In particular, the observed boundaries of NGC 3115, NGC 128, and IC 3973 may be derived. (Extracted)

AD-608 825 Div. 2, 16
OTS Prices: HC $4.00/MF $0.75

Air Force Cambridge Research Labs., Bedford, Mass.
BIBLIOGRAPHY OF LUNAR AND PLANETARY RESEARCH, 1963.
Special Report,
by J. W. Salisbury, R. A. Van Tassel, J. E. Adler, R. T. Dodd, Jr., and V. G. Smalley. Nov 64, 108p
Proj. 8602
AFCRL 64 885; AFCRL SR9
Unclassified report

Descriptors: (*Bibliographies, Astronomy),

(*Moon, Reports), (*Planets, Reports), Subject indexing, Indexing, Abstracting, Space biology, Comets, Meteors, Meteorites, Lunar environment.

A bibliography of lunar and planetary research articles published in 1963 is presented with both subject and author entries. The subject listings, which are abstracted, fall into the following major categories: astrobiology, comets, meteorite craters and cratering effects, meteors and meteorites, the moon, origin of the solar system, the planets, and tektites. (Author)

AD-608 834 Div. 2
OTS Prices: HC $3.00/MF $0.75

Coast and Geodetic Survey, Washington, D. C.
SEISMIC SAFETY NET, SHOAL EVENT.
Final rept.,
by W. V. Mickey and L. M. Lowrie. Aug 64, 77p
VUF 1011; TID 4500, 35th ed.
Unclassified report

Rept. on Vela Uniform Proj. SHOAL.

Descriptors: (*Seismology, Underground explosions), (*Underground explosions, Seismology), Nuclear explosions, Seismic waves, Propagation, Geology, Buildings, Damage, Perception, Humans, Ranges (Distance), Explosion effects, Seismological stations, Geophysics, Earthquakes, Safety.

The seismic signal from Project SHOAL, a 12.5 kt nuclear detonation in granite near Fallon, Nevada, was recorded by the Coast and Geodetic Survey in the distance range from 0.8 km to 441 km. Based upon an earth particle velocity of 5 cm/sec as the assumed dividing line between the safe zone and the damage zone, there were no commercial establishments or sites of habitation within the radius of possible damage for Project SHOAL. This distance was estimated at 4 km on granite and 11 km on alluvium. The radius of human perception for SHOAL, assuming a perception threshold of 0.21 cm/sec, was placed at about 45 km for alluvium foundations. Calculations from strong-motion seismograms placed the source seismic energy for the SHOAL Event at 1.60x 10 to the 18th power ergs, equivalent to an earthquake of unified magnitude, m, 5.17. The 'm' as determined from the Wood-Anderson seismographs was 5.22.

AD-608 864 Div. 2
OTS Prices: HC $2.00/MF $0.50

Service Bureau Corp., New York.
WATER WAVE RUN-UP ON A BEACH.
Research rept.,
by Joseph B. Keller and Herbert B. Keller. Jun 64, 39p
Contract Nonr382800
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Beaches, Water waves), (*Water waves, Motion), Tides, Harmonic analysis, Boundary value problems, Nonlinear systems, Theory, Equations.

While investigating the Tsunami wave project, a numerical method was devised to solve the initial boundary value problem for the equations of the non-linear shallow water theory. The case of one horizontal dimension was considered in a domain bounded by a shore at one end, with the motion of the shoreline taken into account. In addition, this method enabled the incident wave to be introduced at the seaward end of the domain. The water was assumed to be at rest in the domain until the incident wave arrived, and the bottom was assumed to slope uniformly. (Author)

AD-608 875 Div. 2
OTS Prices: HC $2.00/MF $0.50

Columbia Univ., New York.
PLAN GEOMETRY OF HEADLAND-BAY BEACHES.
Technical rept. no. 7,
by Warren E. Yasso. 1964, 35p
Contract Nonr26668, Proj. NR388 057
Unclassified report

Descriptors: (*Beaches, Geometric forms), Bays, Ocean waves, Mathematical analysis, Programming (Computers), United States, Erosion.

A headland-bay beach is defined as a beach lying in the lee of a headland subjected to a predominant direction of wave attack. Such beaches characteristically have a seaward-concave plan shape resulting from erosion caused by refraction, diffraction, and reflection of waves into the shadow zone behind the headland. Tide-induced currents have no direct effect on the plan shape of headland-bay beaches. Increasing radius of plan curvature with distance from the headland suggested testing the logarithmic spiral, r = e theta cot alpha, as an approximation to the shape of headland-bay beaches. Four natural beaches were selected for testing goodness of fit to the logspiral approximation: Spiral Beach, Sandy Hook, New Jersey; Halfmoon Bay Beach, California; Drakes Beach and Limantour Spit Beach lying along the Drakes Bay shoreline to the north of San Franscisco, California. Published maps were used as a source of data on shoreline shape except for Spiral Beach which was mapped by the writer using engineer's transit in a longitudinal survey technique. IBM 7090 computer was programmed to generate a best fitting log-spiral to each shoreline curve. Results range from excellent to good with the best fit being to Spiral Beach curvature. (Author)

AD-608 892 Div. 2, 30
OTS Prices: HC $4.00/MF $1.00

Northwestern Univ., Evanston, Ill.
COMPUTER ANALYSIS OF ORIENTATION DATA IN STRUCTURAL GEOLOGY.
Technical rept. no. 13,
by T. Victor Loudon. 1964, 133p
Contract Nonr122826, Proj. NR389 135
Unclassified report

Descriptors: (*Structural geology, Programming (Computers)), (*Programming (Computers), Structural geology), Faults (Geology), Folds (Geology), Position finding, Mapping, Topology, Vector analysis, Programming languages, Geology, Statistical analysis.

Three-dimensional orientation data can be simplified by transforming them to refer to axes related to the symmetry of the distribution. Three uncorrelated scalar variates are generated by the transformation. Each of the scalar variates generally has direct geological significance. Each variate can be described individually by the usual statistical parameters. Thus, the orientation, tightness, asymmetry, shape and size of folds can be measured statistically; first, in the direction of greatest buckling; second, parallel to the fold axis. The degree to which a fold is cylindrical or conical in form can be estimated by a least-squares method. A Fortran IV program has been written to perform the computations. A consideration of the spatial variation of the parameters allows various

types of folding to be discriminated quantitatively, and permits the testing of hypotheses of the origin of folding. (Author)

AD-608 893 Div. 2, 30
OTS Prices: HC $3.00/MF $0.75

Northwestern Univ., Evanston, Ill.
CLASSIFICATORY AND REGIONAL ANALYSIS BY DISCRIMINANT ITERATIONS.
Technical rept. no. 12,
by Emilio Casetti. 1964, 99p
Contract Nonr122826, Proj. NR389 135
Unclassified report

See also AD-600 575.

Descriptors: (*Weather stations, North America), (*Classification, Iterative methods), (*Geography, Classification), (*Programming (Computers), Effectiveness), Climatology, Mathematical logic, Stability, Algebra, Instruction manuals.

This report is one of a series of computer program manuals arising from a continuing study of computer applications in the earth and environmental sciences, including geology, geography, geophysics, geochemistry, and environmental engineering. The present paper discusses a method for evaluating to what extent a classification of items defined by a set of measures reflects a 'rationale' rather than 'errors.' A geometrical interpretation is provided of the concepts of systematic and random elements of a classification and of the analytic tools proposed. The methods are illustrated by an application to the analysis of a classification of climatic stations. A listing and description of the computer program used is appended.

AD-608 900 Div. 2, 30
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
USE OF FLUORESCENT TRACERS TO DETERMINE FORESHORE SEDIMENT TRANSPORT, SANDY HOOK, NEW JERSEY.
Technical rept. no. 6,
by Warren E. Yasso. 1964, 24p
Contract Nonr26668, Proj. NR388 057
Unclassified report

Descriptors: (*Beaches, Sedimentation), (*Sedimentation, Beaches), (*Tracer studies, Sedimentation), Labeled substances, Fluorescence, Sand, Ocean waves, Tides, Velocity, Particles, Particle size, Erosion, Coatings, Atlantic Ocean, New Jersey.

Each of four size classes of foreshore sand from Sandy Hook, New Jersey, was color coded with daylight and ultraviolet fluorescent coating material. These tracer particles were introduced at mid-swash line on the foreshore surface at Kingmill Beach, Sandy Hook, two hours prior to high tide. During the test Atlantic Ocean waves approaching at an angle of approximately 5 degrees to the shoreline caused 5.3-second breakers of 2.4-foot maximum height. A sampling line transverse to the foreshore was established 100 feet downdrift from the point of introduction. In a time-integration procedure samples were obtained by scraping a 0.10-foot deep and 0.18-foot wide channel a distance of 10 feet upslope from the backwash limit. Sub-samples of the 18 samples taken during the 69.7 minutes after marked particle introduction were examined for tracer particle content. Recovery data indicate particles in the smallest size class ($0.701 > d > 0.589$ mm) began arriving at sampling line 38.9 minutes after introduction: equivalent to 2.6 ft/min maximum transport velocity. Particles in the next largest size class began arriving 50.0 minutes after introduction: equivalent to 2.0 ft/min maximum transport velocity. However, a maximum number of marked particles in both size classes was found in a sample taken 62.3 minutes after introduction.

3. Chemical Warfare Equipment and Materials

AD-608 821 Div. 3
OTS Prices: HC $1.00/MF $0.50

Dalmo Victor Co., Belmont, Calif.
DESIGN AND CONSTRUCTION OF SPIRT (SHORT PATH INFRARED) INSTRUMENTATION.
Bimonthly progress rept. no. 3,
by F. J. Berg. 3 Dec 64, 22p DV-R2976-3670
Contract DA18 035AMC129A
Unclassified report

See also AD-604 110.

Descriptors: (*Gas detectors, Infrared equipment), (*Infrared equipment, Gas detectors), Instrumentation, G agents, Vapors, Infrared transmitters, Infrared receivers, Infrared radiation, Absorption, Measurement, Design, Servomechanisms, Band-pass filters.

This report describes the progress made in the design and construction of a SPIRT (Short Path Infrared Testor) instrument. The function of SPIRT is to measure, as a function of time, the concentration of certain CW agent vapors by means of the peculiar IR absorption properties of these agents. Specifically, these agents exhibit an absorption band centered at 9.8 microns. SPIRT consists of a transmitter and a receiver, separated by an 'active' path of known length. The concentration of agent in this path is to be measured. (Author)

4. Chemistry

AD-608 542 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE.
Quarterly rept. no. 2, Aug-Oct 64,
by Welby G. Courtney. Nov 64, 7p RMD-5515
Contract Nonr4154 00
Unclassified report

See also AD-434 286.

Descriptors: (*Condensation, Reaction kinetics), (*Water vapor, Condensation), (*Alcohols, Condensation), (*Carbon tetrachloride, Condensation), Phase studies, Argon, Nitrogen, Shock tubes, Nucleation.

Condensation was investigated in a shock tube using the rarefaction wave to cool the vapor-inert gas mixture. Reproducible pressure-time data were obtained with H2O and CH3OH using Ar and N2 as the inert gas. Slow condensation was measured at mild conditions and condensation pseudo shocks were observed at drastic conditions. Data with CCl4 were of limited usefulness because of the low heat of condensation. (Author)

AD-608 632 Div. 4
OTS Prices: HC $1.00/MF $0.50

Utah State Univ. of Agriculture and Applied Science, Logan.
THE EFFECT OF STRUCTURAL CHANGES ON THE PYROLYSIS OF ORGANIC ESTERS.
Final rept.,
by Grant Gill Smith. Oct 64, 6p
Grant AF AFOSR62 268
AFOSR 64 2343
Unclassified report

Descriptors: (*Esters, Pyrolysis), Molecular structure, Reaction kinetics, Thermochemistry, Vapors, Molecular isomerism, Bibliographies.

A brief summary is given of systematic studies concerning linear free energy relationships in solvent free systems where the reaction rates are influenced by substituents. A bibliography of the 14 published papers generated under the contract is included.

AD-608 645 Div. 4
OTS Prices: HC $1.00/MF $0.50

Harshaw Chemical Co., Cleveland, Ohio.
INVESTIGATION OF THE EXISTENCE OF OXYANIONS OF FLUORINE AND NITROGEN AND THE NITROGEN-FLUORINE CATIONS.
Quarterly technical summary rept. for 28 Jul-28 Oct 64,
by Gerald L. Hurst and S. I. Khayat. 28 Nov 64, 22p
HQ-76-7
Contract DA31 124AROD76, Proj. 4137C, ARPA Order 402
Unclassified report

Descriptors: (*Nitrogen compounds, Fluorides), (*Oxidizers, Molecular isomerism), (*Molecular isomerism, Oxidizers), Hydrolysis, Synthesis (Chemistry), Ions, Aluminum compounds, Chlorides, Decomposition.

The preparation of trans-N2F2 from N2F4 and AlCl3 in a flow system is described. The thermal isomerization of trans-N2F2 to give cis-N2F2 must be conducted at low pressure to avoid decomposition. Both cis and trans-N2F2 are inert to water at ambient temperatures but hydrolyze slowly at 74-90C yielding mainly nitrogen, oxygen and hydrofluoric acid. The hydrolytic reactions of the N2F2 isomers are first order with respect to the nitrogen fluorides. Unlike NF3, cis and trans-N2F2 are not hydrolyzed via nucleophilic attack in aqueous solution as shown by the fact that caustic soda does not significantly accelerate the reactions. The mechanism of hydrolysis of cis and trans-N2F2 probably involves a bimolecular vapor phase decomposition reaction. No stable intermediates are formed in the hydrolysis reactions of cis or trans-N2F2.

AD-608 655 Div. 4, 14, 17, 25
OTS Prices: HC $1.00/MF $0.50

Metal Hydrides, Inc., Beverly, Mass.
SPECTROGRAPHIC ANALYSIS OF HIGH PURITY MATERIALS.
Final rept.,
by James M. Morris. 31 Aug 64, 25p
Contract AF19 604 7998, Proj. 4608, Task 460802
AFCRL 64 23
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metals, Impurities), (*Impurities, Spectroscopy), Excitation, Chlorination, Electric arcs, Tin, Gallium, Indium, Atmosphere, Materials.

The report summarizes the investigations which were carried out to achieve increased spectrographic sensitivity for trace elements in high purity materials. Direct excitation of samples with the d.c. arc in air and in gaseous atmospheres was investigated. The reaction of chlorine on metal samples of Sn, Ga, and In to concentrate impurities was carried out. Also, an approach where the impurities were released from a molten metal sample was tried. (Author)

AD-608 689 Div. 4, 3, 13
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
FUNDAMENTAL FACTORS IN DETECTING CHEMICALS AS ADSORBED FILMS.
Interim rept.,
by W. A. Zisman. 29 Oct 64, 20p
Projs. RR001 01 43 4751, SP89422
NRL 6168
Unclassified report

Presented at Conference on 'Surface Effects in Detection', sponsored by Illinois Inst. of Research, Illinois Inst. of Tech, Brookings Inst., Washington, D. C., 29 Jun 64.

Descriptors: (*Air pollution, Determination), (*Chemical warfare agents, Determination), Films, Adsorption, Chemisorption, Surface properties, Molecular properties, Contamination, Collecting methods, Odors.

Detection of trace chemicals in the atmosphere is possible by adsorption methods either through the results of physical adsorption or chemisorption processes. If the sensitivity of any such process is to be pushed to the limit, the ability to detect reliably the presence of a condensed monolayer or less becomes essential. Therefore, some of the general characteristics of surfaces and adsorbed

monolayers deserve review with emphasis on the causes of the formation of the film and the conditions leading to optimizing the adsorption, the orientation, and the packing of the molecules to be detected. The nature of the forces responsible for adsorption are reviewed briefly and related to the reversibility of the adsorption process and to the average lifetime of adsorption. Cooperative adsorption including surface micellization, or cluster formation, mixed films, and the helpful or limiting effects due to the presence of previously adsorbed materials are discussed. Finally, some of the most sensitive methods of detecting and measuring the amount of adsorbed material will be reviewed with emphasis on their application to detection of chemicals in the atmosphere. (Author)

AD-608 708 Div. 4, 25
OTS Prices: HC $2.00/MF $0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
SPIN-ECHO STUDIES OF CHEMICAL EXCHANGE. II. CLOSED FORMULAE FOR THE T-2 OF TWO SITES.
Technical rept. no. 76,
by Adam Allerhand and H. S. Gutowsky. 29 Sep 64, 49p
Contract Nonr183413, Proj. NR051 215
Unclassified report

Research partly supported by the National Institutes of Health and the National Science Foundation. Rept. prepared for publication in the Journal of Chemical Physics. See also AD-602 927.

Descriptors: (*Exchange reactions, Nuclear magnetic resonance), Nuclear spins, Relaxation time, Quantum statistics, Numerical analysis, Iterative methods, Programming (Computers).

Closed expressions are derived for the decay in amplitude of successive echoes in nuclear magnetic resonance experiments for systems with two exchanging sites having different resonance frequencies but equal transverse relaxation times 'in the absence of exchange.' The decay is found to be the sum of two exponential terms and two 'pseudo-exponential' terms; the absolute values of the latter decay exponentially but the sign alternates from one echo to the next. For the case of two equally populated sites the decay simplifies to the sum of just one exponential and one 'pseudo-exponential' term. In most cases of experimental importance a single exponential term is much larger than the rest and adequately describes the decay in echo amplitude. An iterative computer procedure is described which uses the expressions to extract information about the system from measurements of the apparent decay time constant as a function of 180 degree pulse separation. (Author)

AD-608 709 Div. 4, 25
OTS Prices: HC $1.00/MF $0.50

Noyes Chemical Lab., Univ. of Illinois, Urbana.
H,H COUPLING IN DIENE-IRON CARBONYL COMPLEXES.
Technical rept. no. 77,
by H. S. Gutowsky and J. Jonas. 28 Oct 64, 9p
Contract Nonr183413, Proj. NR051 215
Unclassified report

Research supported in part by the National Science Foundation.
Rept. prepared for publication in Inorganic Chemistry.

Descriptors: (*Complex compounds, Nuclear magnetic resonance), Iron compounds, Molecular structure, Chemical bonds, Protons, Atomic orbitals, Heterocyclic compounds, Metalorganic compounds.

Attention is called to the existence and importance of the effects of the non-planarity of C and H atoms on the proton spectra of diene-iron carbonyl complexes. It is shown that nuclear magnetic resonance data, particularly the H,H coupling constants, are compatible with 1,4 addition of the Fe to the diene to form a non-planar complex.

AD-608 754 Div. 4
OTS Prices: HC $1.00/MF $0.50

Cornell Univ., Ithaca, N. Y.
ORGANIC ELECTRO-OXIDATIONS.
Final rept.,
by D. H. Geske. 31 Oct 64, 11p
Grant AF AFOSR166 63
AFOSR 64 2249
Unclassified report

Descriptors: (*Nitrophenols, Oxidation), Ions, Electrochemistry, Electrodes, Platinum, Organic solvents, Nitriles, Chemical reactions, Volumetric analysis.

It was found possible to oxidize picrate ion on a platinum electrode in acetonitrile solution. A detailed study of the electrode process was undertaken by means of voltammetry, chronopotentiometry, and controlled potential coulometry. An overall reaction process is proposed which involves a very short-lived picryl radical that decays by at least two different reactions--the most predominant of which forms picric acid by hydrogen abstraction.

AD-608 755 Div. 4
OTS Prices: HC $1.00/MF $0.50

Washington Univ., Seattle.
EQUILIBRIA AND PREPARATIVE METHODS FOR BORON AND SILICON COMPOUNDS.
Final rept.,
by D. M. Ritter. 1 Nov 64, 9p
Grant AF AFOSR102 63
AFOSR 64 2384
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Boranes, Synthesis (Chemistry)), (*Organoboranes, Synthesis (Chemistry)), Silicon compounds, Separation, Chemical equilibrium, Chromatographic analysis, Diboranes, Pentaboranes.

Tetraborane and dihydropentaborane were successfully methylated by reaction with 1,2-dimethyl diborane. Hexaborane-12 was isolated and characterized. Work in progress concerning the alkylation of diboranes, methylated higher hydrides, vinylboranes, and B-Si bonded compounds is summarized.

AD-608 763 Div. 4
OTS Prices: HC $1.00/MF $0.50

University Coll., London (England).
TRITERTIARY ARSINE TRICARBONYL COMPLEXES OF CHROMIUM, MOLYBDENUM AND TUNGSTEN AND THEIR REACTIONS WITH HALOGENS.
Technical rept. no. 2,
by C. D. Cook, R. S. Nyholm, and M. L. Tobe.
Oct 64, 10p
Contract N62558 3589, Task NR356 445
Unclassified report

Prepared for publication in the Journal of the Chemical Society.

Descriptors: (*Arsenic compounds, Complex compounds), (*Chromium compounds, Complex compounds), (*Molybdenum compounds, Complex compounds), (*Tungsten compounds, Complex compounds), Halogens, Chemical reactions, Oxidation, Chlorine compounds, Bromine compounds, Iodine compounds, Synthesis (Chemistry), Spectra (Visible and ultraviolet), Spectra (Infrared), Molecular weight, Electrical conductance.

The hexacarbonyls of chromium, molybdenum and tungsten react with the tritertiary arsine, bis(o-dimethylarsinophenyl)methyl arsine, (TTAS), (I) to form stable tri-carbonyl metal (M) complexes of the type (M(CO)3(TTAS)). The action of halogens upon these complexes was investigated. Two gram atoms of bromine or iodine are consumed per mole of complex yielding salts of the type (M(CO)3(TTAS)X)X, in which the metal atom is presumably seven-coordinate. The stability of these salts in solution decreases in the order M = W > Mo > Cr; the tungsten (II) complex is fairly inert, losing carbon monoxide only very slowly whereas the molybdenum (II) compound loses one mole of carbon monoxide on warming in methanol to form the non-electrolyte species (Mo(CO)2(TTAS)X2(o). The chromium (II) complex readily undergoes further oxidation with complete loss of carbon monoxide to form complexes of the type (Cr(TTAS)X3) where X = Br and I; the trichloro- complex was made by a different procedure. (Author)

AD-608 766 Div. 4, 14
OTS Prices: HC $2.00/MF $0.50

Applied Physics Lab., JHU, Silver Spring, Md.
THERMAL DEGRADATION OF AN AROMATIC POLYPYROMELLITIMIDE IN AIR AND VACUUM. II. THE EFFECT OF IMPURITIES AND THE NATURE OF DEGRADATION PRODUCTS,
by S. D. Bruck. May 64, 29p TG-573
Contract NOw62 0604c

Unclassified report

Descriptors: (*Plastics, Pyrolysis), (*Organic nitrogen compounds, Pyrolysis), Films, Impurities, Degradation, Aromatic compounds, Amides, Reaction kinetics, Spectra (Infrared), Mass spectrum, Air, Vacuum, Chemical bonds, Dissociation, Thermochemistry, Heat of activation.

The effect of impurities on the thermal degradation of poly N,N'-(p,p'-oxydiphenylene) pyromellitimide (du Pont's 'H'-film) is discussed. Purification of the polymer in dimethylformamide decreases the rates of degradation both in air and in vacuum, but only slightly reduces the activation energies. Infrared and mass spectrometric data suggest the participation of polypyromellitamic acid (polyamide acid) impurity in the degradation process by thermal cleavage of its carboxyl and hydrolytic scission of its amide groups. As far as the vacuum pyrolysis of the main polyimide chains is concerned, the activation energy of 74 kcal/mole, bond dissociation energies, and elemental analysis of the residue remaining after pyrolysis suggest that the primary scission occurs at the imide bonds, most likely followed by a secondary cleavage resulting in the elimination of CO groups. (Author)

AD-608 799 Div. 4, 10, 27
OTS Prices: HC $1.00/MF $0.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
EQUATIONS AND DATA FOR CALCULATION OF ELECTRON RECOMBINATION KINETICS IN Cs NO3-Al REACTION,
by A. O. Kresse. 1 Nov 61, 7p BSC-27986, FS-61TN-1012
Contract AF04 647 911

Unclassified report

Descriptors: (*Exhaust gases, Exchange reactions), (*Nitrogen compounds, Oxides), (*Aluminum, Exchange reactions), Rocket motor nozzles, Combustion products, Gas ionization, Plasma medium, Electrons, Reaction kinetics, One-dimensional flow, Difference equations, Differential equations, Data, Programming (Computers).

A series of equations and data are given for use in programming rocket nozzle chemical kinetics. The basic assumptions used are: (1) quasi one dimensional flow; (2) the energetics of the reaction do not influence the pressure and temperature (Vanishingly small mass fraction of reactants in Argon flow); (3) the reactions selected are the dominant ones in the electron depletion process; (4) transport processes are neglected; (5) the throat concentrations are in equilibrium.

AD-608 801 Div. 4, 17, 25
OTS Prices: HC $0.50/MF $0.50

Army Materials Research Agency, Watertown, Mass.
THE DISSOCIATION ENERGIES OF DIATOMIC MOLECULES OF THE TRANSITION ELEMENTS. PART II. TITANIUM, CHROMIUM, MANGANESE, COBALT,
by Arthur Kant and Bernard H. Strauss. Oct 64, 9p
Proj. 1A010501B010
AMRA TR64 34

Unclassified report

See also AD-602 069.

Descriptors: (*Titanium, Dissociation), (*Chromium, Dissociation), (*Manganese, Dissociation), (*Cobalt, Dissociation), Transition elements, Diatomic molecules, Vapors, Mass spectroscopy, Thermochemistry, Heat of sublimation, High-temperature research.

Using information derived from a combination of effusion and mass spectrometric techniques, the dissociation energy of Co2 has been calculated from the ratio of dimeric and monomeric cobalt in equilibrium with the liquid as dissociation energy (Co2) = 30 ± 6 kcal. Upper limits to the dissociation energy of Ti2, Cr2, and Mn2 are also estimated as dissociation energy (Ti2) < 58 kcal; dissociation energy (Cr2) < 44 kcal; dissociation energy (Mn2) < 21 kcal. These results are correlated with the energy required to promote the atom to the lowest lying bonding or valence state of electron configuration 3d to the (n-1) power 4s. (Author)

AD-608 896 Div. 4
OTS Prices: HC $1.00/MF $0.50

California Univ., Los Angeles.
THE VISCOELASTIC RELAXATION MECHANISM OF INORGANIC POLYMERS: AMORPHOUS SELENIUM. Technical rept. no. 6,
by A. Eisenberg and L. Teter. Sep 64, 24p
Contract Nonr23387, Proj. 051 453

Unclassified report

Descriptors: (*Inorganic polymers, Viscoelasticity), (*Selenium compounds, Inorganic polymers), Iodine compounds, Glass, Relaxation time, Transition temperature, Chemical bonds, Molecular structure,

Stresses, Chemical equilibrium.

Selenium is subject to bond interchange in the melt; this is seen from the existence of a dynamic equilibrium between rings and chains. In order to determine whether bond interchange extends down to the glass transition region, the viscoelastic properties of several samples of various chain length were studied. The chain length could be varied by the addition of iodine to the melt, and the iodine content correlated with the chain length by the application of a modified version of the previously developed theory of equilibrium polymerization. The results indicate that the relaxation behavior is molecular weight dependent in exactly the same way as in normal organic polymers, which implies that bond interchange is, for all practical purposes, absent in that temperature range. (Author)

AD-608 897 Div. 4
OTS Prices: HC $4.00/MF $1.00

Electronic Properties Information Center, Culver City, Calif.
FLUOROCARBON GASES.
Data sheets,
by John T. Milek. Nov 64, 117p DS-142
Contract AF33 615 1235, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Halogenated hydrocarbons, Electrical properties), (*Fluorine compounds, Electrical properties), (*Electrical properties, Halogenated hydrocarbons), Gases, Dielectrics, Fluorochlorides, Bromine compounds, Fluorides, Aliphatic compounds, Electrical corona, Data, Dielectric properties, Electrodes, Chemical properties, Physical properties, Temperature, Pressure.

A compilation of the electrical properties of various halocarbon or halogenated hydrocarbons known as Freons, Genetrons, Arctons, etc., is presented. A master identification chart relating the tradenames and numbers to the chemical name is included for easy reference. Detailed electrical properties include Corona effects, dielectric constant, dielectric strength and dissipation factor. Each property is compiled over the widest possible range of pressure, temperature, electrode geometry effects and types of electrodes from references obtained in a thorough literature search. Physical and chemical property data are also included as well as electrical and electronic applications. (Author)

5. Communications

AD-608 505 Div. 5, 2, 6, 8, 12, 30
OTS Prices: HC $4.00/MF $0.75

United Aircraft Corporate Systems Center, Farmington, Conn.
CATEGORY I AND II TEST REPORT FOR TELEMETRIC DATA RECEIVING SET AN/MKR-9.
Rept. for Jul-31 Oct 63.
30 Sep 64, 97p
Contract AF19 628 3357
ESD TDR64 63

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Telemetering receivers, Tests), (*Meterological satellites, Telemetering receivers), Facsimile equipment, Telemetering antennas, Power supplies, Electronic equipment, Human engineering, Reliability (Electronics), Maintainability.

The report presents the results of the Category I and II Test Program on the Telemetric Data Receiving Set AN/MKR-9. These tests were conducted to determine the suitability of the equipment to receive signals from an orbiting meteorological satellite and to provide a facsimile reproduction of pictures transmitted from the satellite. Since there was no suitably instrumented satellite in operation at the time of Category II testing, a special test procedure was used employing a helicopter with a special instrument package to simulate the actual satellite output. The conclusion is reached, from test results, that the AN/MKR-9 will receive and display telemetric data transmitted from an orbiting satellite. However, changes are recommended that will enhance the usefulness of the equipment and reduce existing safety hazards. (Author)

AD-608 530 Div. 5
OTS Prices: HC $1.00/MF $0.50

Westinghouse Electric Corp., Bloomfield, N. J.
DEVELOPMENT OF INFRARED SOURCES.
Quarterly rept. no. 1, 7 Feb-15 Aug 64,
by N. C. Beese. 15 Aug 64, 10p
Contract NObsr91099

Unclassified report

Descriptors: (*Infrared radiation, Xenon lamps), (*Xenon lamps, Infrared radiation), Glass seals, Oxidation, Quartz, Molybdenum, Platinum, Metal films, Life expectancy, Electromagnets, Electrodes, Anodes, Performance (Engineering), Design.

The work consisted in testing several powdered glass sealing glass compositions that might be used to protect ribbon seals from excessive oxidation. Several seals have been cycled between room temperature and elevated temperatures 50 to 100 times with satisfactory performance. A four-element ribbon seal carried 50 amperes for 250 hours without deterioration. (Author)

AD-608 719 Div. 5, 32
OTS Prices: HC $3.00/MF $0.75

Precision Instrument Co., Palo Alto, Calif.
COHERENT LIGHT-RECORDING TECHNIQUES.
Quarterly rept. no. 2, 1 Apr-31 Jun 64,
by Carl H. Becker, Siegfried H. Mohr, and Erwin L. Hahn. Sep 64, 53p
Contract AF30 602 3272, Projs. 4505, 4291,
Task 450503
RADC TDR64 387

Unclassified report

See also AD-603 505.

Descriptors: (*Lasers, Recording systems), (*Recording systems, Lasers), Data storage systems, Communication theory, Quantum mechanics, Magneto-optic effect, Electron optics, Phonons, Quartz.

On the basis of diffraction theory, quantum-mechanics and information theory, it is shown that the principle of coherent light recording is the theoretical ultimate in respect to information density and frequency bandwidth that can be achieved by any data-processing method. This rules out mechanical, magnetic or electric approaches. Photographic coherent light recording tests were made by the dynamic sweep tests on 16 mm Recordak Micro-File Special film SO 267 and AHU 5459. Evaluation of the test results shows that there is a relation between density, line width and recording rate for the various film materials. Averaging over a number of tests, the density of 2.0 (which was considered to be a target density in regard to the required signal-to-noise ratio of the system) yielded a line width of 15 microns on the SO 267 film, and 40 microns on the film AHU 5459. Preliminary efforts extended towards electro-optical and magneto-optical birefringence. Electro-optical deflection began with single prisms of alpha-quartz (X, Y, Z cut), as well as ADP (Z, J cut). Preliminary testing with ADP (Z-cut) yielded an angular deflection of 180 seconds of arc before it was destroyed due to overdriving.

AD-608 782 Div. 5, 8
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
LEAST MEAN SQUARE ERROR ANALYSIS OF PCM TRANSMISSION.
Physical Sciences Research Papers,
by Ian T. Young. Oct 64, 22p
Proj. 8600
AFCRL 64 864; AFCRL PSRP62

Unclassified report

Descriptors: (*Data transmission systems, Errors), (*Pulse modulation, Television transmitters), (*Television transmitters, Optimization), Signal-to-noise ratio, Coding, Attenuation, Video signals, Least squares, Method.

Optimal energy distribution applied to a least mean square error criterion for PCM transmission is discussed. Comparisons are drawn between the optimized scheme and standard scheme for: (1) White Noise Channel (2) White Noise and Rayleigh Fading Channel. It is concluded that for few bit samples only small energy savings are attained. (Author)

AD-608 809 Div. 5, 8, 12
OTS Prices: HC $3.00/MF $0.75

Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
THE RELATIVE MOTIONS OF TWO INDEPENDENT COMMUNICATION SATELLITES.
Rept. for Sep 62-Apr 64,
by Donald R. Shover. Sep 64, 84p
Proj. 4335, Task 433505
SEG TDR64 44

Unclassified report

Descriptors: (*Communication satellites (Active), Position finding), (*Position finding, Mathematical

models), (*Mathematical models, Position finding), Motion, Relativity theory, Vulnerability, Tracking, Elliptical orbit trajectories, Communication equipment, Satellites (Artificial).

This report presents a method of determining the relative positions of two independent communication satellites and the times during which these two satellites are in the proper positions for two specified modes of communication. The method developed is to be used in support of two separate satellite experiments to determine if communication is possible between two satellites, which are physically out-of-line-of-sight of each other, via bending and reflecting radio waves in and through the ionosphere. Presented is a mathematical model that determines the positions of two independent satellites as a function of time in the earth coordinate system in terms of co-latitude, longitude, and altitude. Both satellites are tracked from their injection points throughout their orbits in finite-time increments for a preselected time. In conjunction with determining the positions of the satellites, the model also determines the time, with respect to some given time reference, when the satellites enter and leave the line-of-sight of any set of designated geographical positions as well as when the satellites enter and leave the line-of-sight of each other. The recorded times are summed, and the percentages of the recorded times, based on the total time considered, are determined. (Author)

AD-608 817 Div. 5, 25
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
PULSE MODULATION OF AN ELECTRON INJECTION LASER TRANSMISSION SYSTEM,
by E. J. Schiel, E. C. Bullwinkel, R. R. Gammarino, J. F. Armara, and R. E. Webb. 1952, 3p
Unclassified report

Descriptors: (*Light communication systems, Lasers), (*Lasers, Light communication systems), (*Communication systems, Lasers), Turbulence, Distortion, Audio-frequency, Pulse modulation, Fourier analysis, Design, Signal-to-noise ratio, Light transmission, Gases, Helium, Neon.

Amplitude modulation of gas lasers in CW operation are easily achievable in the audio frequency range either by modulation of the rf pump power or by electro-optical or piezoelectric modulators. In initial experiments a He-Ne gas laser (Spectra Physics Nr. 112) with hemispherical resonator arrangement emitting at 6328 was employed. Pump modulation allowed a modulation depth of the emitted coherent radiation of 100% with an average power output of three milliwatts. The light signal was collected in a 4 foot telescope (Questar) and received by an RCA 7265 photomultipler. This experimental system was used for the transmission of one audio channel.

6. Detection

AD-608 697 Div. 6, 12, 18
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
THE COMPUTATION OF OPTIMUM ORBITAL ELEMENTS DERIVED FROM A SINGLE COINCIDENT OBSERVATION BY TWO RECEIVING STATIONS OF THE NAVAL SPACE SURVEILLANCE SYSTEM.
Interim rept.
by Howard Gerard deVezin, Jr. 22 Oct 64, 77p
Proj. RT8801 001 652 1 S434 00 01
NRL 6172

Unclassified report

Master's thesis.

Descriptors: (*Orbital trajectories, Numerical analysis), (*Satellites (Artificial), Orbital trajectories), (*Space surveillance system, Coincidence range finding), Position finding, Height finding, Astronautics, Doppler effect, Errors, Analysis, Least squares method, Continuous wave radar, Radar tracking.

This thesis is concerned with an investigation into a method of determining the orbital elements of a passive artificial earth satellite using information obtained from a single coincident satellite observation of short time duration. This method would introduce weighting factors determined, for example, by the accuracy with which the system can measure the parameter in question. This method is then used to study the effect that the addition of doppler shift and bistatic range measurements have on the accuracy of the resulting orbital elements.

AD-608 710 Div. 6, 25
OTS Prices: HC $3.00/MF $0.75

Raytheon Co., Burlington, Mass.
PHOTOELECTRIC MILLIMETER WAVE DETECTOR.
Final rept.,
by G. F. Giggey, P. P. Debye, and P. R. Bratt.
Oct 64, 63p
Contract AF30 602 3015, Proj. 5573, Task 557301
RADC TDR64 292

Unclassified report

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Descriptors: (*Millimeter waves, Detectors), (*Photoelectric effect, Radiation measurement systems), (*Extremely high frequency, Detectors), Photoconductivity, Semiconductors, Intermetallic compounds, Antimony alloys, Indium alloys, Arsenic alloys, Gallium alloys, Germanium, Low-temperature research, Infrared photoconductors, Infrared photoelectric cells.

The most emphasis is centered on maximizing the overall performance of n-type indium antimonide which operates by a combination of mechanisms - conventional photoconductivity, magnetically induced energy gap and free carrier absorption. The sample detector operates at liquid helium temperature or below and has the following properties: (a) Peak detectivity at approximately 2 mm wavelength although detectivity range is from 100 microns to over 8 mm. (b) Time constant of 250 nanoseconds. (c) Double dewar package configuration with an integral super-conducting solenoid. Other materials such as impurity activated germanium, gallium arsenide, and indium arsenide were investigated for sensitivity to millimeter and sub-millimeter radiation. Some samples of gallium arsenide were found to be highly sensitive to millimeter radiation of 2 and 4 mm wavelength. A sample of antimony doped germanium grown program was tested unstrained and found to be sensitive in the sub-millimeter wave region (.105 mm). (Author)

AD-608 886 Div. 6, 2
OTS Prices: HC $3.00/MF $0.50

Aerospace Technology Div., Library of Congress, Washington, D. C.
TRACKING OF MISSILES AND SPACE VEHICLES: COMPILATION OF ABSTRACTS.
Rept. no. 22.
13 Nov 64, 52p
ATD P64 62; TT 65 60413

Unclassified report

Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Ionosphere, Atmospheric sounding), (*Electromagnetic wave reflections, Planets), (*Radio astronomy, Instrumentation), (*Tracking, Space environmental conditions), Atmosphere, Ion exchange, Recombination reactions, Electromagnetic properties, Scientific satellites, Radar scanning, Extraterrestrial radio waves, Antennas, Oscillators, Lasers, USSR, Reviews.

This report covers materials contained in Soviet open literature published during the second half of 1963. Information not directly related to the assigned subject has been included because of its broad implications for study in this field. Topics covered in this series are: Ion clouds and ionosphere perturbations, reflection of EM waves from the Moon, Sun, planets, or artificial satellites, and radio astronomy (radio emission, antennas, and quantum molecular oscillators).

AD-608 887 Div. 6, 23, 28
OTS Prices: HC $2.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A PRELIMINARY STUDY OF THE EFFECTS OF BRIEFING LEVELS ON RECONNAISSANCE PERFORMANCE WITH SIDELOOKING RADAR.
Final rept. for Jan-Mar 64,
by J. C. Welch and Don F. McKechnie. Oct 64, 27p
Proj. 7184, Task 718404
AMRL TR64 101

Unclassified report

Descriptors: (*Training, Side-looking radar), (*Target recognition, Performance tests), (*Position finding, Performance tests), Navigators, Air force personnel, Display systems, Aerial reconnaissance, Plan position indicators, Human engineering, Flight, Simulation.

Sixteen Air Force navigators were tested, after appropriate training, on four strips of side-looking radar imagery. The imagery, at a scale of 1: 197,000, moved across a back-lighted 14- by 14-inch screen at 3.3 inches per minute - corresponding to 500 knots. The subject's task was to identify all airfields, bridges, tank farms, power lines and railroad yards. The speed and accuracy of locating and identifying these targets under four different levels of briefing were assessed. The four briefing levels were: none, 10 minutes study of the corresponding chart prior to the simulated flight, access to the chart during but not prior to the flight, 10 minutes study of the

chart prior to the flight and access to it during the flight. Fifty-six percent of the targets were correctly identified. On the average the target traveled 3.1 inches (56 seconds) after first appearing on the screen before being identified. False positive responses averaged 30%. The briefing levels compared, however, had no significant differential effects on the speed and accuracy of identifying targets or on the number of false positives. It suggests that new briefing techniques and materials will need to be developed. (Author)

AD-608 912 Div. 6, 12, 24
OTS Prices: HC $2.00/MF $0.50

Philco Corp., Palo Alto, Calif.
A CAMERA TIMING SYSTEM FOR SATELLITE CONTROL USING K-37 AERIAL CAMERA.
Technical note,
by I. W. Richardson, R. A. West, and S. Douglas.
9 Nov 62, 47p WDL-TN-62-5

Contract AF04 695 113

Unclassified report

Descriptors: (*Timing devices, Camera controls), (*Camera components and accessories, Timing devices), (*Optical tracking, Cameras), Photographic equipment, Aerial cameras, Photogrammetry, Satellites (Artificial), Orbital trajectories, Mathematical prediction, Antennas, Calibration, Tracking cameras, Timing circuits, Wiring diagrams, Feasibility studies.

A camera and timing system has been designed and built which, when used in conjunction with the existing Photogrammetric Triangulation System (PTS) and orbital prediction programs, will aid the Mathematical Analysis Department in its investigation of the feasibility of calibrating antennas using satellites instead of fly-by aircraft. The cameras are conversions of government surplus K-37 aerial cameras with f/2.5 Ektar lenses of 12-inch focal length. The timing system records shutter events to within several milliseconds. This report describes the system and discusses its utilization. (Author)

7. Electrical Equipment

AD-608 551 Div. 7, 13
OTS Prices: HC $2.00/MF $0.50

Marquart Corp., Van Nuys, Calif.
INVESTIGATION OF THE CURRENT DENSITY LIMITATIONS IN A THERMIONIC CONVERTER.
Technical summary rept. for 1 Nov 63-31 Oct 64, by C. Kaplan and J. B. Merzenich. 31 Oct 64, 28p Marq-25,150
Contract Nonr3738 00, Proj. NR099 366
Unclassified report

Prepared for publication in the Proceedings of the Thermionic Conversion Specialist Conference held at NASA-Lewis Research Center, Cleveland, Ohio, October 26-28, 1964.

Descriptors: (*Thermionic converters, Current limiters), Cesium, Xenon, Electric currents, Voltage, Electric power production, Electric discharges, Electric arcs, Work functions, Ions, Plasma physics.

A large number of current-versus-voltage curves were obtained, using pure cesium (Cs) and also a cesium-xenon mixture (Cs+Xe). Comparison of the Cs+Xe data with the Cs data shows that the addition of 60 torr of xenon gas to the converter yielded an increase of from 15 to 80% in output power, for a fixed emitter temperature and a given output voltage. Pulsed-discharge experiments were performed with pure cesium (Cs) and also with a cesium-xenon mixture (Cs+Xe). A high-current pulse was applied to the converter, followed by rapid switching to lower current levels. The pulsed current-voltage characteristic, obtained by measuring the current and voltage just after the pulse, indicates that the transport losses in the converter are eliminated by the excess positive ions produced during the pulse. The electron current just after the pulse is limited only by the work function barriers.

AD-608 554 Div. 7, 14, 25
OTS Prices: HC $3.00/MF $0.75

Martin Marietta Corp., Baltimore, Md.
A STUDY PROGRAM ON CESIUM VAPOR FILLED THERMIONIC CONVERTERS HAVING HIGH VACUUM WORK FUNCTION EMITTER MATERIALS.
Yearly summary rept. for 1 Nov 63-31 Oct 64, by A. J. Kennedy. 31 Oct 64, 81p MND-3177
Contract Nonr3639 00, Proj. NR099 363
Unclassified report

Descriptors: (*Thermionic converters, Materials), (*Ruthenium, Thermionic converters), Energy conversion, Plasma medium, Cesium, Vapors, Neutron cross sections, Iridium, Rhenium, Molybdenum, Work functions, Diodes, Flame spraying, Material forming, Ionic current, Degasification.

Ruthenium, a material having relatively low neutron absorption cross section, was investigated both as an emitter and collector in a thermionic converter. Both hot pressed and plasma sprayed ruthenium emitters were found to behave like high vacuum work function materials (i.e., display high output current densities at relatively low cesium pressures). Significant differences were noted, however, in the performance of the two ruthenium emitters prepared by the different processes. The performance of the ruthenium emitters is compared to that of iridium and rhenium emitters. Generally, the ruthenium data shows a higher output power density, particularly at relatively wide (10 to 30 mil) interelectrode gaps. The ruthenium plasma sprayed collector assumes its minimum value at a temperature which is lower than that for a molybdenum collector by approximately 100K. The value of collector work function at optimum is indicated to be approximately equal for ruthenium and molybdenum. (Author)

AD-608 638 Div. 7, 9, 25
OTS Prices: HC $2.00/MF $0.50

Allison Div., General Motors Corp., Indianapolis, Ind.
MEASUREMENT OF FLUID PROPERTIES FOR MAGNETOPLASMADYNAMIC POWER GENERATORS.
Quarterly technical summary rept. no. 6, 1 Aug-31 Oct 64,
by R. T. Schneider. 17 Nov 64, 34p EDR-4037
Contract Nonr4104 00, ARPA Order 420
Unclassified report

See also AD-604 889.

Descriptors: (*Magnetohydrodynamics, Generators), (*Energy conversion, Magnetohydrodynamics), Fluid mechanics, Electric power production, Plasma medium, Cesium, Injection, Pumps, Helium, Separation, Magnetic fields, Voltage, Electrodes, Thermal diffusion, Theory.

The major problems in the design of a magnetoplasmadynamic system have been those associated with the gas heater, cesium seeding, helium purification, and helium-cesium separation. These problems have now been solved to the degree that reliable operation of the MPD system has been achieved. Operation of the present small MPD system yielded sufficient information to permit design of the large test section which is now under construction. Ceramic and tantalum parts were never subject to severe attack by cesium. The quartz window in contact with the hot cesium-helium mixture was found to devitrify immediately. No attack occurred, however, when the windows were sufficiently cooled. It was necessary, therefore, to remove the windows from direct contact with the hot working fluid. The usefulness of the electron heating effect can not be determined before the 50-cm channel is in operation. As preliminary indications, however, the following observations can be reported. It was not possible to observe an increased electron temperature with load resistance down to 100 ohm. Since the measurements reported in previous quarterly summary reports were made, new numerical results became available. From these results it can be seen that an increased electron temperature can hardly be expected when using a load even as low as 100 ohm.

AD-608 649 Div. 7, 19
OTS Prices: HC $1.00/MF $0.50

Navy Mine Defense Lab., Panama City, Fla.
A MINIATURE FLASHING LIGHT FOR BUOYS.
Final rept.,
by Henry V. Johnson and Clell A. Dildy, Jr.
Nov 64, 14p
Proj. SF011 02 35, Task 2518 1
NMDL RDR247
Unclassified report

Descriptors: (*Navigational lights, Spar buoys), (*Miniature electrical equipment, Navigational lights), Circuits, Transistors, Batteries and components, Mercury, Environmental tests, Life expectancy.

A transistorized flashing light has been developed for use with small spar buoys. The light weighs two ounces, exclusive of the seven-cell mercury battery pack which acts as a buoy counterweight, and is visible at one mile

to the unaided eye. The flashing circuit permits operation only at night. Battery life is approximately three weeks at a flash rate of 110 flashes each minute. Cost of the complete light in a watertight container is about twenty-five dollars. The miniature light is considered satisfactory under good visibility conditions for use with buoys spaced up to 2000 yards apart, and is recommended for use in mine countermeasures operations. (Author)

AD-608 661 Div. 7, 8
OTS Prices: HC $6.00/MF $1.25

General Electric Co., Palo Alto, Calif.
SUPPRESSION OF SPURIOUS EMISSIONS.
Final rept. for Apr 63-Apr 64,
by R. H. Stone, R. Z. Gerlack, and C. K. Birdsall.
Sep 64, 220p R64ELM247-4
Contract AF30 602 2955, Proj. 4540, Task 454003
RADC TDR64 227
Unclassified report

Descriptors: (*Power equipment, Emissivity), (*Filters (Electromagnetic wave), Absorption), Microwave equipment, L band, Radar equipment, Wave transmission.

The feasibility of using open periodic structures in microwave filters was studied for suppressing spurious and harmonic energy generated by high power transmitters. An L-band breadboard model was fabricated and tested at both low and high power and the experimental results validated the theoretical analysis. This filter is capable of handling 2.5 megawatts of peak power and has a spurious harmonic rejection of at least 50 db over the entire measured stop band. The techniques used in this filter however are capable of peak power levels of at least 10 megawatts. When this microwave filtering concept is fully developed, filters can be produced and installed in high power radar systems at a cost substantially less than of using other state-of-the-art filters with the same electrical characteristics.

AD-608 666 Div. 7
OTS Prices: HC $2.00/MF $0.50

Inland Testing Labs., Dayton, Ohio.
ALKALINE CELL EVALUATION AND ANALYSIS.
Quarterly technical progress rept. no. 2, 15 Aug-15 Nov 64,
by E. A. Roeger, Jr., and P. R. Voyentzie. 1 Dec 64, 27p
Contract AF33 615 1580, Proj. 8173, Task 817304 25
Unclassified report

Descriptors: (*Alkaline cells, Reliability), Seals (Stoppers), Materials, Plastics, Electrical properties, Nickel, Cadmium, Silver, Zinc.

The purpose of the program is to determine the actual failure mechanism of all components of alkaline storage batteries and to determine techniques and materials to prevent these premature failures, and to devise analytical methods for predicting the life of cells under any environmental condition. The program is also concerned with determining methods for gas suppression and the hermetic sealing of alkaline cells. (Author)

AD-608 684 Div. 7, 12, 25
OTS Prices: HC $1.00/MF $0.50

Sandia Corp., Albuquerque, N. Mex.
THE HYPERSONIC PLASMA CONVERTER: II,
by K. J. Touryan. Nov 64, 48p SC-RR-64-979
Unclassified report

Descriptors: (*Reentry vehicles, Power supplies), (*Plasma sheath, Energy conversion), Nose cones, Hypersonic flow, Plasma jets, Generators, Electrodes, Gas ionization, Thermoelectricity, Feasibility studies.

As a continuation to Part I (SC-4960(RR)) of the hypersonic plasma generator known as ASP (Aerodynamic Supply of Power), experimental analyses have been extended to investigate in detail the various parameters that govern the operation of the generator. A final feasibility study was made, and possible modifications to the theory are outlined. Test runs in the Sandia Corporation arc jet with air as the working fluid at 12,000 BTU/lb have generated 8 amp/sq in short circuit currents and 2.3 volts open circuit voltage. Under favorable conditions, full-size re-entry vehicles in the altitude range of 200,000 to 80,000 feet are expected to yield several kilowatts of power. (Author)

AD-608 831 Div. 7, 25
OTS Prices: HC $3.00/MF $0.75

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
NONEQUILIBRIUM ELECTRIC CONDUCTIVITY OF WET AND DRY POTASSIUM VAPOR,
by Alexander W. Rowe and Jack L. Kerrebrock.
2 Nov 64, 75p
Contract AF33 615 1083, Proj. 8173, Task 817306
APL TDR64 106
Unclassified report

Descriptors: (*Potassium, Electrical conductance), (*Magnetohydrodynamics, Generators), (*Spacecraft, Power supplies), Rankine cycle, Heat exchangers, Vapors, Plasma medium, Electrons, Drops, Gas ionization, Electron capture, Thermionic emission, Boilers, Heaters, Condensers (Liquefiers).

The nonequilibrium electric conductivity of two-phase potassium vapor was studied both theoretically and experimentally. This study is important in connection with the design of Rankine-cycle alkali-metal magnetohydrodynamic (MHD) generators. The theoretical work indicates that small condensation droplets (mean radius less than 50 A) will detrimentally affect the achievement of elevated electron temperatures by Joule heating, and will also reduce the vapor ionization associated with this temperature. These effects, which arise from large electron-drop collision energy losses, are negligible when the mean droplet radius is greater than 200 A. A high-temperature (maximum temperature = 2000K) closed-loop facility was constructed for the study of nonequilibrium ionization in wet and dry potassium vapor. Preliminary experimental results on the electric conductivity of potassium in a subsonic test section are given. The results suggest that the condensation existed as a myriad of nucleation-sized (mean radius approx. 10 A) droplets which reduced the nonequilibrium conductivity appreciably below that of the dry vapor. (Author)

AD-608 839 Div. 7, 4
OTS Prices: HC $2.00/MF $0.50

Rensselaer Polytechnic Inst., Troy, N. Y.
ELECTROCHEMICAL ENERGY CONVERSION IN A PALLADIUM HYDROGEN DIFFUSION ELECTRODE.
Scientific rept. no. 4,
by H. J. Cleary and N. D. Greene. Aug 64, 28p
Contract AF19(604)8377, Proj. 6694, Task 669406
AFCRL 64 803
Unclassified report

See also AD-296 569.

Descriptors: (*Energy conversion, Electrodes), (*Fuel cells, Electrodes), (*Electrodes, Fuel cells), (*Palladium, Hydrogen), Diffusion, Polarization, Oxidation, Electric currents, Electrochemistry, Membranes.

A high efficiency palladium-hydrogen diffusion electrode has been developed. Current densities of 165 ma/cm are achieved at 30C on 0.010 inch wall electrodes after pretreatment by abrading and oxidizing in air at 800C. Hydrogen transport is governed by solid state diffusion. An equation for hydrogen diffusion in beta-pd has been determined: D(sub beta) = 3.8 x 0.0001 exp(-2930/RT). (Author)

AD-608 857 Div. 7
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
PRACTICAL AVERAGING CIRCUITS,
by Donald G. Watts. Oct 64, 12p MRC-TSR-518
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Circuits, Snythesis), Control systems, Theory, Electrical networks, Statistical analysis.

Simple practical circuits for on-line averaging of continuous quantiles are given together with an explanation of why simple averaging circuits such as a first-order exponential lag provides good averaging in spite of the fact that its impulse response is a very poor approximation to the ideal finite-time averaging circuit. It is shown that an averaging circuit should be chosen on the basis of a step response. (Author)

AD-608 878 Div. 7, 12
OTS Prices: HC $1.00/MF $0.50

Kearfott Div., General Precision, Inc., Little Falls, N. J.
VELOCITY SENSING SWITCH.
Final engineering rept.
by William C. Albert. 28 Sep 64, 18p
Kearfott-M22033.7
Contract DA30 069AMC418A
Unclassified report

Descriptors: (*Velocity, Monitors), (*Electric switches, Velocity), Control, Design, Tests, Materials, Aluminum, Electrical equipment, Magnets, Thermal insulation, Expanded plastics, Tapes, Phenolic plastics, Damping, Fluid flow, Silicone, Oils, Mathematical analysis.

This is the final report on the development of a Velocity Sensing Switch by Kearfott Division for Picatinny Arsenal. The device is basically an unconstrained (along its sensing axis), viscous-damped proof mass which integrates an input acceleration and closes a switch when a preset velocity is reached. Important design considerations covered are envelope, materials used, design of automatic damping control, velocity adjustment, contacts and latch mechanism. Procedures and problems encountered during assembly and testing are discussed along with calibration methods. Design goals for future devices based on experience gained on this project are also discussed. (Author)

AD-608 880 Div. 7
OTS Prices: HC $4.00/MF $0.75

Federal Aviation Agency, Oklahoma City, Okla. Aeronautical Center.
FUEL CELLS; SELECTED REFERENCES.
Bibliographic list no. 2,
comp. by Lois J. Stout. Nov 64, 103p Unclassified report

Descriptors: (*Fuel cells, Bibliographies, (*Batteries and components, Bibliographies), (*Bibliographies, Fuel cells), Electric power production, Electrolytes, Electrodes, Electrochemistry, Electric propulsion, Zinc, Ammonia, Biochemistry, Hydrocarbons, Hydrogen, Sodium alloys, Mercury alloys.

Contents: General, Ammonia, Automotive, Biochemical Fuel cells, Design, Electrochemistry, Electrodes, Hydrocarbons, Hydrogen, Hydrogen generators, Natural gas, Regenerative, Research fuel cells, Sodium amalgam, Special, Theory, Zinc.

AD-608 890 Div. 7, 8
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Schenectady, N. Y.
ULTRA HIGH POWER TRANSMISSION LINE TECHNIQUES.
Rept. for 1 Apr-30 Jun 64,
by John P. Quine. Oct 64, 40p
Contract AF30 602 2990, Proj. 5573, Task 557301
RADC TDR64 414 Unclassified report

Descriptors: (*Transmission lines, Power), (*Waveguides, Design), Feasibility studies, Waveguide bends, Waveguide couplers, Tapers, Power dividers, Electromagnetic waves, Propagation, Optimization

The purpose of this investigation is to develop systematic procedures for selecting optimum waveguide configurations and designing waveguide components that will operate at high levels of peak and average power in the frequency range 1-10 gigacycles. In particular, the feasibility will be investigated of designing compact components such as bends, couplers, power dividers, tapers, and mode absorbers in waveguides having cross section dimensions in the range 1.5 to 2.5 free space wavelengths. In the present report the design and fabrication of tapers, bends, and a 20 db directional coupler for the experimental program is described. A description of a resonant cavity method for high power testing is also presented. (Author)

AD-608 913 Div. 7
OTS Prices: HC $3.00/MF $0.75

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
Annual technical summary rept. no. 2, 15 Dec 63-30 Oct 64,
by W. B. Hall and R. J. Hill. 30 Oct 64, 78p
Contract Nonr401200FBM Unclassified report

Descriptors: (*Power equipment, Energy conversion), (*Thermionic converters, Work functions), (*Work functions, Thermionic converters), Cesium, Thermionic emission, Rhenium, Voltage, Test equipment (Electronics), Liquid metals, Electric power production, Vapor plating, Brazing, Molybdenum, Palladium, Nickel, Vapor pressure, Electrodes.

The construction and evaluation of a unique device for studying collectors of thermionic converters operating in the 'Ball-of-Fire' mode are described. The test vehicle contains one emitter and a rotating disc on which six collectors are mounted. Without disturbing the vacuum condition, each collector may in turn be brought adjacent to the emitter and the electrode combination can be operated as a converter. The emitter temperature, collector temperature, cesium reservoir temperature, and interelectrode spacing may all be independently varied and measured. A porous rhenium collector was found to be best in terms of both output voltage and output power. The stability of this kind of collector over a period of time was examined, and design recommendations are made for practical converters on the basis of the findings. (Author)

8. Electronics and Electronic Equipment

AD-608 478 Div. 8, 2, 25
OTS Prices: HC $4.00/MF $1.00

Selenia, S. P. A., Rome (Italy).
MAGNETO-IONIC MICROWAVE PROPAGATION EXPERIMENT.
Technical final rept. for 1 Feb-31 Oct 63,
by A. Gilardini, P. de Santis, and G. Assenso. Jun 64, 123p
Contract AF61 052 668
AFCRL 64 804

Unclassified report

Descriptors: (*Ionospheric propagation, Plasma physics), (*Microwaves, Ionospheric propagation), (*Plasma medium, Ionosphere), Electric moments, Magnetic fields, Microwave frequency, Whistlers, Statics, Mathematical analysis, Italy.

The report describes theoretical and experimental work. The characteristic equations for guided propagation along a static magnetic field in some transversally non-homogeneous bounded and unbounded plasmas are derived by the method of non-destructive multiple reflections of a free wave, propagating according to the ray theory. A few specific cases (whistler, QC longitudinal, very-slow waves) are considered in detail. Propagation in plasma slabs not aligned with the magnetic field is also discussed. Experimental work includes a preliminary investigation on the radiation pattern in a plasma of an electric dipole directed along the magnetic field. (Author)

AD-608 480 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
HOLLOW CATHODES IN NEGATIVE-GRID TUBES,
by George C. Fincke, Jr. Oct 64, 11p
USAEL ECOM2507

Unclassified report

Descriptors: (*Cathodes (Electron tubes), Geometric forms), Thermionic emission, Triodes, Tetrodes, Voltage, Space charges, Electric currents, Density, Electron tubes.

This study involved factors important to the successful operation of hollow cathodes in negative-grid tubes: (1) activation rate; (2) mechanism of operation; and (3) grid action with truncated pyramidal hollow cathodes. A method of reducing the activation rate by ten-fold was investigated and achieved. The mechanism of operation was studied utilizing sectionalized cathodes. Results tend to confirm the theoretical model postulated by Babcock, et als. Unusual grid-control characteristics associated with hollow cathodes were experimentally derived and indicated the basis for the observed transconductance limitation. (Author)

AD-608 481 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

Transitron Electronic Corp., Wakefield, Mass.
PRODUCTION ENGINEERING MEASURE. DIFFUSED SEMICONDUCTOR DEVICES. DEVICE 14 PNP.
Special test rept. for 6 Jul 56-31 Mar 64.
31 Mar 64,
Contract DA36 039SC72714

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transistors, Reliability (Electronics)), Semiconductor devices, Diffusion, Germanium, Silicon, Storage, High-temperature research, Life expectancy, Performance (Engineering), Tests.

The results of 2000 hours of operating life and 1000 hours of high temperature storage life on Device 14 Type 2N1084, Signal Corps Transistors are presented. The data has been summarized in graphical form to show the effects of these tests on various parameters. Engineering conclusions are given. Distribution data is presented graphically representing all parameters of the Device 14 specifications. (Author)

AD-608 492 Div. 8, 6, 19
OTS Prices: HC $3.00/MF $0.75

AVCO Corp., Cincinnati, Ohio.
THE DESIGN, DEVELOPMENT AND EVALUATION OF IMPROVED STC EQUIPMENT FOR APPLICATION TO ATC RADARS,
Final rept.,
by G. David Hubbard and Ronald J. Wagner. Jun 64, 86p
Contract AF19 604 8854
ESD TDR64 518

Unclassified report

Descriptors: (*Timing circuits, Airport radar systems), (*Radar equipment, Timing circuits), Sensitivity, Search radar, Radar clutter, Attenuation, Radar signals, Voltage, Radar pulses, Trigger circuits, Gates (Circuits), Digital systems, Analog systems, Transistors, Air traffic control systems.

The need for improved Sensitivity Time Control circuits in Air Traffic Control radar equipment becomes more imperative as Emergency Mission System search and precision radars become more sensitive and all-weather tracking and controlling to within a mile of the radar site becomes standard procedure. This report traces the development of a sophisticated logarithmic STC circuit from previously derived concepts through incorporation in, and evaluation of, the latest EMS search radar. The development of Digital Video Data processing equipment led to design and experimental work on a digital STC concept. The preliminary investigation of this concept indicates that a significant advance in this direction is possible in clutter attenuating devices. Reference is also made to the current EMS system including test results plus recommendations for improvements in anti-clutter devices for present and future search and precision radars. (Author)

AD-608 507 Div. 8, 2b
OTS Prices: HC $2.00/MF $0.50

Linde Div., Union Carbide Corp., Parma, Ohio.
DEVELOPMENT OF THIN ORGANIC ROLLED FILM CAPACITOR.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 64,
by D. J. Valley. 30 Sep 64, 25p
Contract NObsr89519, Proj. SR0080302ST9636

Unclassified report

Descriptors: (*Capacitors, Production), (*Dielectric films, Capacitors), Aluminum, Foils, Decontamination, Electrolytic polishing, Surface properties, Plastic-coatings, Processing, Aging (Materials), Reliability (Electronics), Life expectancy, Electrical properties.

Progress is reported on a program to develop a capacitor, using ML-1 film as the dielectric, capable of 100 volt operation over the temperature range of -55 to 170C (See AD-604 410). Topics include: foils (substrate preparation, surface decontamination, mechanical smoothing, electropolishing); coated foil evaluation; new slitting machine, processes (standard process, winding tension, termination, can atmospheres, conditioning); metallized type ML-1 film capacitors (tab terminated devices).

AD-608 509 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

IIT Research Inst., Chicago, Ill.
EXCESS NOISE IN SEMICONDUCTORS.
Annual summary rept. no. 9, 15 Nov 63-14 Nov 64,
by James J. Brophy. 9 Nov 64, 43p IITRI-A066
Contract Nonr1800 00, Proj. NR017 432
Unclassified report

See also AD-423 372.

Descriptors: (*Semiconductors, Noise (Radio)), (*Noise (Radio), Semiconductors), Gallium alloys, Arsenic alloys, Luminescence, Diodes (Semiconductor), Photoelectric effect, Audiofrequency, Phototubes Noise analyzers.

Both the forward current noise spectrum and the optical emission noise spectrum of a GaAs luminescent diode exhibit characteristic relaxation times of 13 and 2.3 milliseconds. Presumably, these are related to injected carrier transitions associated with photon emission. In further confirmation of this interpretation is the fact that the low frequency noise level of both spectra is several orders of magnitude greater than shot noise associated with the junction current. The reverse current noise spectrum is simple 1/f noise over the frequency interval from 10 to 10,000 cps. No change in character of the spectrum is observed under optical illumination of the junction, so that the effect is attributed to reverse leakage currents. To define more clearly the optical emission noise spectrum, it is necessary to reduce the optical detector noise level. Experiments are underway cross-correlating the outputs of two photodetectors, which reduces the influence of internal detector noise. (Author)

AD-608 555 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

ITT Electron Tube Div., Easton, Pa.
PRODUCTION ENGINEERING MEASURE FOR A PHASE II SUPER POWER HYDROGEN THYRATRON TUBE.
Quarterly progress rept. no. 9, 7 Mar-6 Jun 64,
by H. E. Krefft. 6 Jun 64, 10p
Contract DA36 039SC85985
Unclassified report

Descriptors: (*Thyratrons, Hydrogen), Test sets, Performance (Engineering), Manufacturing methods.

AD-608 557 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

Sprague Electric Co., North Adams, Mass.
PRODUCTION ENGINEERING MEASURE FOR IMPROVED RELIABILITY OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Quarterly rept. no. 5, 29 Jun-29 Sep 64,
by J. M. Eckfeldt and J. H. D. Folster. 29 Sep 64, 32p
Contract DA36 039AMC03621E Unclassified report

See also AD-605 223.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Reliability (Electronics), Life expectancy, Voltage, Tantalum, Electrolytes, Machines, Capacitance, Power metals, Sintering, Soldering, Failure (Mechanics), Coatings.

Sixteen experimental lots (Nos. 37-39, 41, 42, and 49-59) completed processing during this period and were placed on life test. Descriptions of the ratings making up these lots, the processing incorporated in them, and the results of pre-life test measurements on them are presented in this report. No additional experimental lots are scheduled to be started through the manufacturing process. Also provided in this report are final life test results on the capacitors of Lots 28-33, 40, 45, and 47 which are undergoing the 85C, rated voltage life test, interim and final life test results on the capacitors of Lots 24-30, 40, and 45 which are undergoing the 125C, rated voltage life test, and interim life test results on the capacitors of Lots 31-33, 46, and 47 which are undergoing the 125C, rated voltage life test. All design and construction work on equipment for mechanizing the assembly operation was completed during this quarter. Three of the seven machines have been successfully tested, two others are about to be evaluated, and the remaining two machines are undergoing minor revisions. (Author)

AD-608 580 Div. 8
OTS Prices: HC $1.00/MF $0.50

Erie Technological Products, Inc., Pa.
PRODUCTION ENGINEERING MEASURE FOR RESISTOR-CAPACITOR MICROELEMENTS FOR MICROMODULES.
Quarterly rept. no. 5, 27 Jun-25 Sep 64,
by J. E. Schupp. 25 Sep 64, 16p
Contract DA36 039AMC01479E
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Modules (Electronic), Microminiaturization (Electronics), (*Capacitors, Manufacturing methods), (*Resistors, Manufacturing methods), Voltage, Temperature, Noise (Radio), Paints, Encapsulation, Performance (Engineering).

Progress is reported to establish capability to manufacture Resistor-Capacitor Combination Microelements for Micromodules, including actual fabrication and testing of preproduction samples, and accomplishment of production type run to demonstrate mass production techniques and facilities. (Author)

AD-608 581 Div. 8
OTS Prices: HC $1.00/MF $0.50

Innsbruck Univ. (Austria).
MAGNETIC DIPOLE ANTENNAS FOR RECEIVERS.
Scientific rept. no. 10,
by Wolfram Bitterlich. 15 Sep 64, 14p
Contract AF61 052 490
AFCRL 64 928
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Dipole antennas, Magnetic materials), Very low frequency, Magnetic properties, Design, Antenna components, Antenna configurations, Radio interference.

Antenna types of small dimensions for the reception of VLF signals < 20 kc/sec are discussed. Dimensioning and design of an optimum ferrite antenna for the VLF region are discussed as well as possible screening. (Author)

AD-608 582 Div. 8, 2
OTS Prices: HC $5.00/MF $1.00

Innsbruck Univ. (Austria).
ON THE PROPAGATION OF VLF WAVES IN SOLIDS.
Technical annual summary rept. no. 3,
by W. Bitterlich. Dec 63, 164p
Contract AF61 052 490
AFCRL 64 929

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radio waves, Propagation), (*Rock (Geology), Wave transmission), Very low frequency, Meters, Radio transmitters, Underground antennas, Antenna radiation patterns, Probes (Electromagnetic), Solids, Electrical conductance, Magnetic moments, Austria.

The main problem scheduled for the year by the team working on VLF problems was the explanation and elimination of discrepancies between the results of theoretical calculations and experimental measurements that still existed. For this purpose all factors influencing the propagation of VLF waves were studied theoretically and the experimental methods of measurement were further developed. The improvement of all apparatus used so far as well as the expansion of measurements over much greater distances at which clear effects are to be expected according to theoretical considerations, are of special importance. Measurements were conducted in German and Dutch mines to explain the effect of different geological bodies on wave propagation; furthermore, a number of conductivity measurements were made.

AD-608 583 Div. 8, 26
OTS Prices: HC $2.00/MF $0.50

National Semiconductor Corp., Danbury, Conn.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE 2N328A TRANSISTOR.
Quarterly progress rept. no. 4, 31 Mar-30 Jun 64,
by R. R. Rau. 30 Jun 64, 30p
Contract DA36 039AMC01480E

Unclassified report

Also includes Proposed Specification for High Reliability Transistors Types 2N328A and 2N329A.

Descriptors: (*Transistors, Manufacturing methods), Silicon alloys, Reliability (Electronics), Furnaces, Aluminum, Vapor plating, Failure (Mechanics), Quality control, Specifications, Welding.

The output of the etch wheel has continued to be monitored by using the daily yield at dry line test box location. Additional furnaces were installed on one side of the proposed line, as well as a two-tier track which will hold more transistor trays. The oxygen analyzer is presently being used to monitor the gas at three locations in the final assembly line. More aluminum evaporated units were fabricated. The best slices gave good 2N328A yield as well as a more than adequate BV sub CEO sort yield. Devices made from evaporated slices with smaller emitters and collectors gave lower yields. The reason for this problem is not yet known. A few grounded collector units were made using an epitaxially deposited junction and an n+ ring to allow an aluminum contact to be made for the base. The final test program has been re-evaluated. Because of the possible occurrence of a different mode of failure at higher power levels, the long term failure tests will be conducted at 400 mw, 450 mw, and 500 mw. Derating curves will be used to establish the power levels of operation for the low failure rates of 0.05%/1000 hours at a 90% confidence level. An Inspections and Quality Control Plan has been submitted and approved. A proposed specification for High Reliability Transistor Type 328A and 329A has been submitted and is here enclosed. (Author)

AD-608 594 Div. 8
OTS Prices: HC $2.00/MF $0.50

Litton Industries, San Carlos, Calif.
RESEARCH ON NOISE IN CROSSED-FIELD GUNS.
Quarterly rept. no. 5, 1 Jul-30 Sep 64,
by R. P. Wadhwa. 20 Oct 64, 38p
Contract NObsr89546

Unclassified report

Descriptors: (*Microwave amplifiers, Crossed field devices), (*Crossed field devices, Noise (Radio), (*Electron guns, Design), Gain, Space charges, Electron beams, Traveling-wave tubes, Velocity, Magnetic fields.

The design of the noise transformer at the exit of the short Kino gun is briefly described. Some results of the simulation of the velocity jump configuration on the Litton Precision Resistance Network Analogue are discussed. Design of the high-power gun is briefly summarized. Noise figure calculations are described for two different tubes. The calculated noise figure values are higher than the experimental values although there is good qualitative agreement. The difference in the noise figure values for the two cases is correlated with the difference in the diocotron gain in the two guns. It is found that transverse velocity and space-charge fluctuations contribute significantly to the total noise figure. It is shown that for noise figure evaluation it is necessary to consider all the waves particularly when the gain is less than 30 db, as is usually the case in crossed-field amplifiers. The variation of noise figure with beam position is shown. (Author)

AD-608 595 Div. 8, 2
OTS Prices: HC $1.00/MF $0.50

Stanford Electronics Labs., Stanford Univ., Calif.
STUDY OF NATURAL AND MAN-MADE VLF PHENOMENA.
Final rept. for 1 Aug 63-31 Jul 64,
by D. L. Carpenter. Oct 64, 16p
Grant AF AFOSR62 370
AFOSR 64 2067

Unclassified report

Descriptors: (*Electron density, Upper atmosphere), (*Upper atmosphere, Electron density), (*Whistlers, Propagation), Ionosphere, Field theory, Plasma medium, Ions, Aurorae, Radio waves, Very low frequency.

Three principal areas of investigation are reviewed: (1) whistler mode propagation, (2) magnetospheric electron density studies using whistlers, and (3) wave-particle interactions.

AD-608 599 Div. 8, 30
OTS Prices: HC $5.00/MF $1.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.

THEORY OF SCANNING SYSTEMS,
by F. E. Temnikov. 23 Sep 64, 158p
FTD MT64 04; TT 65 60263

Unclassified report

Edited machine trans. of mono. Teoriya Razvertyvayushchikh Sistem, Moscow/Leningrad, 1963, 168p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Scanning, Theory), Mechanical scanning, Optical scanning, Electronic scanners, Functions, Multiple operation, Digital systems, Mathematical programming, Automation, USSR, Communication theory.

This book is devoted to the theory of scanning compensation systems, mathematical interpretation of scanning functions and general classification of these systems and functions. The author outlines ways of new developments in the fields of full-scale automation and telemechanization of industrial processes. The book is intended for engineers working in the field of investigation and design of equipment of automation and telemechanics. (Soviet editor's note)

AD-608 616 Div. 8, 25
OTS Prices: HC $2.00/MF $0.50

Microwave Associates, Inc., Burlington, Mass.
MILLIMETER WAVE COMPONENT DEVELOPMENT (BEAM-PLASMA AMPLIFIER).
Quarterly technical note no. 5, 21 Feb-20 May 64,
by Paul Chorney and Richard J. Madore. Oct 64,
44p
Contract AF30 602 2948, Proj. 5573, Task 557304
RADC TDR64 354 Unclassified report

Descriptors: (*Millimeter waves, Amplifiers), (*Microwave amplifiers, Plasma physics), (*Plasma physics, Microwave amplifiers), Pressure, Magnetic fields, Probes (Electromagnetic), Microwave networks, Design, Plasma medium, Xenon, Electron beams, Waveguides, Test equipment (Electronics).

Experiments are described on a plasma tester which allows radial and axial density profile measurements to be taken. A definite density maximum in the radial profile is shown which was not heretofore observed in previous experiments. The axial profiles show a maximum in the center of the discharge. Data was taken with pressure and magnetic field as parameters. A new Langmuir probe design is discussed in which the probe is shielded from cathode evaporation and sputtering. A theory for the double-hot-cathode PIG discharge is described based on ambipolar diffusion in a magnetic field. The theory indicates density profiles that are in agreement with experiments. Thus it is concluded that the discharges are diffusion controlled. The present status of the 2 mm BPA study vehicle is described. The results of electrical measurements on some of the waveguide components are discussed. (Author)

AD-608 617 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Command, Fort Monmouth, N. J.
TE(01) CROSS-GUIDE ISOLATOR.
Technical rept.,
by Elmer Freibergs and Richard A. Stern. Jul 64, 23p
Proj. 1P6 22001A057, Task 1P6 22001A057 02
ECOM 2430

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Waveguides, Resonance), (*Resonance, Waveguides), (*Absorption, Resonance), Wave transmission, Electromagnetic waves, Attenuation, Microwaves, Ferromagnetic materials, Ferromagnetism, Millimeter waves, Magnetic fields, Cylindrical bodies, Mathematical analysis.

A cross-guide or cruciform waveguide ferrite resonance load isolator has been developed for use with the existing circular waveguide TE(01) mode components. This unit provides reverse-to-forward attenuation ratios in excess of 15:1 over an 8 percent bandwidth centered at 35.22 Gc. A semiquantitative mathematical analysis of the electromagnetic waves propagating in the empty cruciform waveguide has also been performed and expressions for the field components derived. (Author)

AD-608 618 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Electron Physics Lab., Univ. of Michigan, Ann Arbor.
THE SOLUTION OF NONLINEAR BOUNDARY-VALUE TRANSPORT PROBLEMS IN ELECTRON AND PLASMA DEVICES.
Interim rept.,
by Charles L. Dolph and Ronald J. Lomax. Oct 64,
81p ORA-TR-72
Contract AF30 602 2884, Projs. 5573, 05228,
Task 557303
RADC TDR64 393

Unclassified report

Descriptors: (*Transport properties, Charged particles), (*Boundary value problems, Transport properties), (*Diodes (Electron tubes), Space charges), Electron tubes, Plasma physics, Traveling-wave tubes, Electron beams, Plasma oscillations, Integration, Nonlinear differential equations, Difference equations, Statistical functions, Partial differential equations, Series, Polynomials, Transformations (Mathematics).

A method of solution of the nonlinear Landau-Vlasov equation which occurs in charged particle transport phenomena is described. The method is similar in concept to the Spherical Harmonics Method of neutron transport theory since the particle distribution function is expanded in orthogonal functions of velocity to obtain an infinite set of partial differential equations. The nonlinearity arises when the particle interactions are taken into account in the force term of the Landau-Vlasov equation. The latter is introduced into the equation iteratively and a numerical integration routine is described to integrate the set of equations resulting from a finite (nth order) truncation of the expansion. The truncated equations, which are for the first n velocity moments of the distribution function, are such that these moments satisfy the untruncated equations also, whereas higher moment equations are modified by a fictitious source term. The convergence of the finite-difference equations and the convergence of the finite-difference solution to the solution of the differential equations is proved for the linear case in which the force is assumed to be known. (Author)

AD-608 623 Div. 8, 25, 26
OTS Prices: HC $5.00/MF $1.25

Westinghouse Research Labs., Pittsburgh, Pa.
SILICON CARBIDE, 500C POWER RECTIFIERS.
Final rept. for 1 Jul 62-31 Aug 64,
by R. B. Campbell, J. R. Davis, Jr., and L. J. Kroko.
Nov 64, 186p
Contracts AF33 657 8719, AF33 657 7027, Proj. 8128,
Task 812808
AL TDR64 253 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Crystal rectifiers, Silicon compounds), (*Silicon compounds, Carbides), Semiconductor devices, High-temperature research, Crystal growth, Epitaxial growth, Encapsulation, Nucleation, Sheets, Processing, Electrical properties, Voltage, Tungsten, Gold alloys, Tantalum alloys, Aluminum alloys.

The preparation of 500C SiC rectifiers having a forward current capability of 10A (half wave average) while sustaining a peak reverse voltage of 150 volts has been shown practicable. During the program, several crystal growth techniques were investigated for the fabrication of power rectifiers. These include the sublimation, thermal reduction and modified Czochralski methods. Methods for obtaining larger crystals and controlling nucleation have been extensively studied in the sublimation method. Crystals of high purity up to 15 mm across have been grown. The thermal reduction and modified Czochralski methods essentially investigated the feasibility of growing SiC ribbon or sheets using a hexagonal SiC platelet as a seed. Although some growth along the a-direction occurred, the amount and quality was not sufficient for device studies. Junctions were formed in SiC by sublimation, diffusion and epitaxial growth techniques. The sublimation-grown junction method was successful in preparing crystals for high current capacity rectifiers. Device fabrication techniques, such as lapping, etching, contracting and encapsulation have been developed for 10A rectifiers. Initial experiments on a non-hermetic encapsulation have been promising. The use of a new type of tungsten backing plate with grain texture parallel to the direction of heat flow has reduced the thermal impedance of the device. (Author)

AD-608 636 Div. 8, 25, 26
OTS Prices: HC $3.00/MF $0.75

Ion Physics Corp., Burlington, Mass.
PN JUNCTION FORMATION TECHNIQUES.
Final rept. for Oct 63-Aug 64.
15 Nov 64, 96p
Contract AF33 615 1097, Proj. 8173, Task 817301
APL TDR64 113 Unclassified report

Descriptors: (*Semiconductors, Preparation), (*Single crystals, Impurities), (*Semiconducting films, Preparation), Ion beams, Van de Graaff generators, Silicon, Heat treatment, Spectroscopy, Crystal growth, Plasma jets, Silicon compounds, Halides, Molybdenum, Quartz, Solar cells, Vapor plating.

The report describes investigations on the fabrication of silicon single-crystal cells by ion implantation techniques and thin-film cells by plasma deposition techniques. N on P cell efficiencies were raised to the 13% level through improvements in the implantation process, subsequent heat treatment, and contacting. Control of the junction characteristics and therefore cell spectral response through the inherent control of the implantation technique was conclusively demonstrated. Plasma deposition as a process was studied in detail. Much of the program involved investigations with source feed gases (silicon halides) which were incompatible with formation of semiconductor grade films by this process. Experiments with silicon hydride resulted in functional (low resistivity, doped, highly crystalline, low impurity level) films on foreign substrates (molybdenum and quartz), thereby demonstrating the basic tenets of the plasma deposition process.

AD-608 639 Div. 8
OTS Prices: HC $2.00/MF $0.50

General Electric Co., Syracuse, N. Y.
PERFORMANCE AND LIFE EVALUATION OF A SEALED LIGHT VALVE TUBE.
Final summary technical rept. for 19 Jun 63-19 Jun 64,
by Edmund F. Schilling. Sep 64, 36p
Contract NObsr89400, Proj. SR008 03 01, Task 9499
Unclassified report

Descriptors: (*Viewing screens, Image tubes), Cathode ray tubes, Electron beams, Films, Vacuum, Display systems, Light, Performance (Engineering), Life expectancy, Electron guns, Xenon lamps, Lenses, Electron tubes, Photographic projectors.

The results indicate that suitable technology exists for packaging light-valve tubes in conventional cathode-ray-tube form; and, hence, tubes can be designed to run reliably for extended periods of time, be maintainance-free, and be replaceable. Although present tubes are suitable for 500-hours operation, extension of the techniques used, improvements in components, and control of process variables should allow for tube performance in excess of 2000 hours. End of life is expected to be subjective and primarily due to picture deterioration, rather than catastrophic in nature. (Author)

AD-608 644 Div. 8, 25, 26
OTS Prices: HC $4.00/MF $0.75

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS. FINAL RELIABILITY PROOF TESTING AND THE INDUSTRIAL PREPAREDNESS STUDY.
Final rept., vol. 1,
by Lucille T. Kelley and Jeremiah A. LoConte.
30 Jun 64, 112p
Contract DA36 039SC86724
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transistors, Germanium), (*Manufacturing methods, Transistors), Reliability (Electronics), Processing, Specifications, Tests, Stresses, Failure (Mechanics), Temperature, Storage, Life expectancy, Environmental tests, Surface properties.

This report covers the final process specifications and procedures for the manufacturing of the 2N297A type power transistor, including the bill of materials. All the process sequences which resulted from engineering tests and evaluations written in the contract are included in the final report manuals. The final reliability test results of the life testing has attained and exceeded the final reliability objective of 0.05% per 1000 hrs. at 95 C with 90% confience.

AD-608 656 Div. 8
OTS Prices: HC $2.00/MF $0.50

Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF TWO X-BAND VARIABLE GAIN TWTs (ONE LOW LEVEL AND ONE MEDIUM LEVEL).
Interim development rept. no. 1, 1 Jul-30 Sep 64.
Nov 64, 38p
Contract NObsr91341, Proj. SFO 100201, Task 9294
Unclassified report

Descriptors: (*Traveling-wave tubes, X band), Gain, Helixes, Voltage, S band, Noise (Radio), Electrons beams, Velocity, Design.

The general behaviour of the TWT gain with varying helix voltage is discussed. Gain change is frequency sensitive due to b-parameter variation. Traveling-wave tubes

in X- and S-bands were tested. Gain in both tubes changed more at the high than at the low frequency end of the band. Effects of helix-voltage change on both noise figure and saturated power output was measured and related to theory. It was decided that the best approach to the problem would be a four-helix structure. The input helix is used to establish noise figure, the output helix to generate gain, and the intermediate helices for gain control. (Author)

AD-608 658 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Airborne Instruments Lab., Inc., Deer Park, N. Y.
MILLIMETER AND SUBMILLIMETER COMPONENT DEVELOPMENT.
Interim rept. for Mar-Jun 64,
by J. J. Taub, J. Cohen, H. J. Hindin, G. Kurpis, and F. R. Arams. Sep 64, 93p
Contract AF30 602 3343, Proj. 5573, Task 557304
RADC TDR64 331

Unclassified report

Descriptors: (*Millimeter waves, Waveguides), (*Waveguides, Millimeter waves), Dielectrics, Instrumentation, Band-pass filters, Transmission lines, Filters (Electromagnetic waves), Varactor diodes, Rotation, Quartz, Ferrites, Performance (Engineering), Equations, Semiconductor devices.

Progress is discussed on a program for the development of oversize waveguide components for the millimeter and submillimeter wavelength range. The program is concerned with the investigation of various filter devices, diode detection-varactor mounts, and various applications of Faraday rotation. All these devices are to be configured in oversized waveguide. (Author)

AD-608 659 Div. 8, 25, 26
OTS Prices: HC $6.00/MF $1.50

Microwave Associates, Inc., Burlington, Mass.
VARACTOR DIODE INDUSTRIAL PREPAREDNESS MEASURES.
Final rept. for 25 Jun 60-25 Jun 64.
25 Jun 64, 242p
Contract DA36 039sc85941

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Varactor diodes, Manufacturing methods), (*Manufacturing methods, Varactor diodes), Silicon, Diffusion, Microwave equipment, Production, Processing, Welding, Packaging, Glass, Ceramic materials, Protective treatments, Specifications, Tests, Life expectancy, Hermetic seals.

Through the use of a spring machine, new silicon mounting procedures, purchased strong hermetic alumina packages, and passivation techniques, an efficient production facility of reliable varactor diodes has been created. The work done on the glass varactor diode (Type III), and the axial 'pill' diode (Type II), the welded 'pill' III diode, and Rs measurement techniques, has also allowed the efficient production of varactor diodes. With the aid of these techniques more than 200 varactor diodes can now be manufactured to applicable specifications in an eight (8) hour day. (Author)

AD-608 669 Div. 8, 30
OTS Prices: HC $2.00/MF $0.50

MacLeod Instrument Corp., Fort Lauderdale, Fla.
DIGITAL SELECTOR SWITCH.
Final summary rept. no. 7,
by Maurice Lefka. 12 Oct 64, 31p
Contract DA01 009AMC87A, Proj. PA AG63 48

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electronic switches, Timing devices), (*Timing devices, Electronic switches), Switching circuits, Timing circuits, Digital systems, Modules (Electronic), Magnetic materials, Sensitivity, Electromagnetic shielding, Test equipment (Electronics), Environmental tests, Shock resistance, Vibration, Reliability (Electronics), Feasibility studies.

The function of the Digital Selector Switch is to permit time selection from 0.1 to 999.9 seconds. An engineering survey was initially conducted and its findings indicated glass reed-type switches well suited for this application. The first design considerations were to determine the ideal switch sensitivity, permanent magnet strength and minimum allowable spacing between adjacent switches. A series of experimental tests were conducted and the values for switch and permanent magnet combination were determined. Thirty test modules were fabricated; each module housed five reed switches and served as switch holder during environmental testing. The switches were subjected to vibration, high-low temperature and thermo-shock environmental testing. Various packaging concepts were investigated and a number of feasibility models were fabricated to test these concepts. The most promising model consisted of mounting a permanent magnet to a moving tape. The tape serves the dual function of transporting the magnet to the appropriate switches, and provides a visual indication of the time set-in by viewing a number inscribed on the tape. This concept readily lends itself to push button position selection.

AD-608 685 Div. 8, 26
OTS Prices: HC $1.00/MF $0.50

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
5000-HOUR LIFE TEST DATA.
Final rept., suppl.
1964, 13p
Contract DA36 039SC86726

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Transistors, Silicon), (*Reliability (Electronics), Transistors), Life expectancy, Epitaxial growth, Experimental data, Performance (Engineering).

5000-hour life test data is presented for the improved silicon epitaxial 2N914 transistor.

AD-608 693 Div. 8, 25, 26
OTS Prices: HC $4.00/MF $1.00

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS. VOLUME III: QUALITY CONTROL MANUAL.
Final rept., vol. 3.
30 Jun 64, 145p
Contract DA36 039sc86724

Unclassified report

Legibility of this document is in part unsatisfactory.

Reproduction has been made from best available copy.
See also AD-608 694.

Descriptors: (*Transistors, Germanium), (*Quality control, Transistors), (*Instruction manuals, Quality control), Specifications, Test equipment, Reliability (Electronics), Environmental tests, Packaging.

AD-608 694 Div. 8, 25, 26
OTS Prices: HC $3.00/MF $0.75

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS. VOLUME II: PRODUCTION PROCESS MANUAL.
Final rept., vol. 2.
30 Jun 64, 71p
Contract DA36 039sc86724
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.
See also AD-608 644, AD-608 693.

Descriptors: (*Transistors, Germanium), (*Manufacturing methods, Transistors), Brazing, Metallurgy, Alloys, Soldering, Chemical milling, Tests, Welding, Aging (Materials), Electrical properties, Finishes and Finishing, Processing, Instruction manuals.

AD-608 707 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Texas Instruments, Inc., Dallas.
ADVANCED FABRICATION PROCESS FOR FUNCTIONAL ELECTRONIC BLOCKS.
Interim engineering rept. no. 3, 2 Jun-2 Sep 64,
by W. T. Matzen. 19 Nov 64, 73p TII-03-64-74
Contract AF33 615 1242
Unclassified report

See also AD-602 761.

Descriptors: (*Integrated circuits, Semiconductor devices), (*Semiconductor devices, Integrated circuits), Silicon, Transistors, Dielectric films, Current amplifiers, Video amplifiers, Thermal properties, Stability, Feedback, Electric filters, Digital systems, Low frequency, Oscillators, Design, Manufacturing methods.

Studies of the silicon adaptive element were continued. Primary effort has been toward the development of transparent conductive contacts. A study of the Seeback effect for application as a thermal sensor in thermal-electrical FEB's was initiated. Theoretical and experimental analyses are included. Design of the Temperature-Stabilized Substrate was completed and devices are in process. Development of the thermal-feedback video amplifier was completed. Performance data is presented. Investigations of an RC active filter for use as a bandpass amplifier are continuing. Detailed design criteria are presented along with experimental results for both breadboard and integrated versions of the amplifier. (Author)

AD-608 711 Div. 8, 5, 6
OTS Prices: HC $7.00/MF $1.75

Melpar, Inc., Falls Church, Va.
FRESNEL ZONE ANALYSIS.
Final rept.,
Oct 64, 336p
Contract AF30 602 3020, Proj. 4540, Task 454002
RADC TDR64 368 Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Antennas, Mathematical analysis), (*Phased arrays, Antenna radiation patterns), (*Antenna radiation patterns, Mathematical analysis), Electromagnetic waves, Focusing, Integrals, Antenna feeds, Electric fields, Frequency, Interference, Measurement, Programming (Computers), Radar antennas, Communication equipment.

The report presents the objectives and results of an investigation of the interference effects of Fresnel region phenomena. Analytical techniques are described that will enable calculation of Fresnel region radiation patterns for monopulse antennas, elliptically or irregularly shaped apertures, and phased arrays. The results from investigations of defocusing techniques, radial E-field in the Fresnel region, effects of reflections in the Fresnel region, antenna to antenna coupling in the Fresnel region, and spurious frequency response are also presented. A unique measurement technique, called Fresnel ring focusing, is described, and gives testimony for a feasible means for obtaining the far-field pattern of a large aperture antenna with measurements taken well within the far-field-Fresnel region boundary. In comparison with other means using the Sommerfield expansion to produce such results, the Fresnel ring focusing technique appears to have many advantages, which are outlined. Recommendations for future investigation including a study of parameter errors and their effect upon the latter technique are included. (Author)

AD-608 725 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. RELIABILITY THROUGH PROCESS IMPROVEMENT (ESTENSION TO 2N2525 TRANSISTOR FAMILY).
Quarterly rept. no. 1, 1 Jun-31 Aug 64,
by G. Erkan and B. H. Wiley. 31 Aug 64, 38p
Contract DA36 039SC86742E
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Reliability (Electronics), Packaging, Welding, Silicon, Diffusion, Modules (Electronic), Ceramic materials, Hermetic seals, Brazing, Cold working.

Two methods of final package closure have been investigated during this quarter. They were stitch welding and cold welding. Stitch welding proved too slow to be of practical use resulting in work being concentrated on cold welding. With proper design of the cold welding dies a high yield and practical production rate can be obtained. Detailed drawings of improved ceramic package design were make and sample lots ordered. Feed-through pin seals were optimized to give a 95-100% yield of hermetic seals. (Author)

AD-608 728 Div. 8, 25
OTS Prices: HC $3.00/MF $0.75

Electronic Defense Labs., Mountain View, Calif.
LIGHT MODULATION DETECTOR.
Interim engineering rept. no. 2, 15 Jul-15 Oct 64,
by Russell Targ, D. E. Caddes, E. O. Ammann, W. D. Bush, and G. A. Massey. 16 Nov 64, 59p
EDL-M-779
Contract AF33 615 1938
Unclassified report

See also AD-604 022.

Descriptors: (*Demodulators, Light), (*Lasers,

Oscillators), (*Oscillators, Lasers), Frequency modulation, Microwave frequency, Modulators, Helium, Neon, Microwave oscillators, Polarization, Frequency stabilizers, Mixers (Electronic), Stabilization, Electronics, Optics.

This report describes an experimental and theoretical program for the stabilization of a laser local oscillator. The local oscillator is intended for use in an optical heterodyne receiver for the detection and demodulation of microwave-modulated light. The work in this quarter was divided into three main activities. The first was assembly and test of the electronic and microwave systems which make up the automatic frequency control loop, and the second was evaluation of the single-sideband suppressed-carrier modulator. The third activity consisted of the development of a technique for laser mode control in which the He-Ne laser is operated in a manner which forces the laser's modes to comprise the sidebands of an FM signal. The development of this FM laser makes possible the use of high-power multimode lasers in many applications where one would previously have been limited to the use of single-mode lasers with their necessarily lower power. Also reported is work on techniques which allow certain electro-optic devices, such as shutters and modulators, to be used with light of arbitrary polarization. (Author)

AD-608 748 Div. 8, 30
OTS Prices: HC $4.00/MF $1.00

Electronics Research Lab., Univ. of California, Berkeley.
ELECTRONICS RESEARCH LAB. CONSOLIDATED QUARTERLY REPORT NO. 14.
Rept. for 16 May-15 Aug 64.
15 Aug 64, 139p
Contract AF33 615 1045; Grant AF AFOSR139 64
Unclassified report

Also supported by Contract AF33 615 1078, Grants AF AFOSR230 64, AF AFOSR292 64, Contract DA36 039AMC02164E, Grant DA ARO D31 124G317, Grants NsG354, NSF GP2203, NSF GP2239, NSF GP2413, NSF GP2684, Contracts Nonr222 53, Nonr22257, Nonr22292, Nonr365611. See also AD-602 949.

Descriptors: (*Electronics, Scientific research), Bionics, Semiconductors, Circuits, Networks, Electron beams, Microwave amplifiers, Crossed field devices, Plasma physics, Electromagnetic radiation, Propagation, Waveguides, Antennas, Solid state physics, Electron microscopy, Semiconductor devices, Transistors, Integrated circuits, Systems engineering.

A review of research in the following areas is given: bioelectronics, circuits, electron streams, plasmas, radiation and propagation, solid-state electronics, systems.

AD-608 749 Div. 8, 2, 12
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
STUDIES OF IONOSPHERIC RADIOPHYSICS BY MEANS OF SATELLITES,
by William C. Hoffman. 22 Jan 58, 37p P-1263
Unclassified report

Prepared for use in the 'Manual of the IGY Rocket and Satellite Programs.'
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ionospheric propagation, Radio transmission), (*Radio transmission, Ionosphere), (*Satellites (Artificial), Atmospheric sounding), Telemeter systems, Doppler effect, Radio interferometers, Radio astronomy Wave transmission, Geophysics.

AD-608 775 Div. 8
OTS Prices: HC $5.00/MF $1.25

RCA Defense Electronic Products, Camden, N. J.
PRODUCTION ENGINEERING MEASURE. MICRO-ELEMENT DIODES.
Formal engineering rept.
Nov 64, 179p
Contract DA36 039SC75968, Task 32
Unclassified report

Rept. on Micromodule Program Extension II.

Descriptors: (*Diodes (Semiconductor), Microminiaturization (Electronics)), (*Subminiature electronic equipment, Diodes (Semiconductor)), (*Microminiaturization (Electronics), Modules (Electronics)), (*Modules (Electronics), Microminiaturization (Electronics)), Silicon, Silicon alloys, Voltage regulators, Manufacturing methods, Soldering, Disks, Performance (Engineering), Aging (Materials), Packaging, Hermetic seals.

Considerable difficulty was experienced when diodes were soldered onto the microelement lands. The difficulty was particularly pronounced under 200C storage. Under this condition, tin-lead and tin-lead-silver solders oxidized and the joint increased in resistance to an unacceptable degree, or opened completely. Superior results were achieved by the use of axial-leaded diodes (round or flat leads) mounted on the wafer, as compared to a 'button' style set into the wafer. The performance of the diodes themselves was generally very good. Evidence was obtained which indicated that the diodes were not damaged unduly by the mounting procedure, but that they benefitted from a 200C, 1000 hour burn-in prior to mounting. No appreciable difference was observed between alloy and diffused junction diodes. Some difficulty was experienced with the microelement wafers. (Author)

AD-608 778 Div. 8
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
THE DIELECTRIC AND WIRE GRID TRANSMISSION LINE.
Physical Sciences Research papers,
by Otho E. Kerr, Jr. Nov 64, 22p
Proj. 4600
AFCRL 64 882; AFCRL PSRP63
Unclassified report

Descriptors: (*Transmission lines, Dielectrics), (*Antennas, Waveguides), Wire, Sheets, Design, Scanning, Propagation, Admittance, Mathematical analysis, Wave transmission.

A surface wave antenna which has six parameters is discussed. The formulas developed permit a somewhat independent control of the phase and amplitude distribution along surface wave and leaky wave antennas. This design lends itself more readily to the fabrication of non endfire surface wave antennas that were previously designed for the same purpose. Finally it is noted that the formulas developed can be used to design a large number of well known wave guides and surface wave transmission lines. (Author)

AD-608 812 Div. 8, 26
OTS Prices: HC $3.00/MF $0.75

Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Norwood, Mass.
PRODUCTION ENGINEERING MEASURE FOR CAPACITORS, FEED-THROUGH, SOLID ELECTROLYTE TANTALUM PELLET.
Quarterly rept. no. 2, 1 Jul-30 Sep 64,
by W. G. Bailey. 30 Sep 64, 70p
Contract DA36 039AMC03630E

Unclassified report

See also AD-603 645.

Descriptors: (*Tantalum capacitors, Manufacturing methods), Electrolytic capacitors, Life expectancy, Environmental tests, Performance (Engineering), Aging (Materials), Quality control.

The processing and assembly of two groups of engineering samples (200 starts each) has been done with a very minimum of mechanical losses and indicates that no mechanical modifications of the capacitor design will be required for future manufacturing. The test data compiled on Group I Engineering Samples and on several lots of evaluation samples, resulted in process changes for Group II Engineering Samples, which gave improved DF and insertion loss characteristics over the Group I Engineering Samples. The dip in insertion loss above 100 Mc appears to be characteristic of the feed-through capacitor design. Evaluation tests on purchased anodes indicate that they are acceptable and it is planned to use them in the preproduction samples. Life test failures on both groups of engineering samples indicate that prolonged low impedance aging may be necessary to screen out those units which might be capable of passing a life test in very low impedance circuits such as directly off of batteries. (Author)

AD-608 815 Div. 8, 33
OTS Prices: HC $2.00/MF $0.5(

Bernard Electronics Co., Washington, D. C.
SOLID-STATE LIGHTING CONTROLLER.
Final rept.,
by Bernard R. Boymel. Jun 64, 27p
Contract FA WA4654, Proj. 421 24E
FAA RD64 112

Unclassified report

Descriptors: (*Marker lights, Runways), (*Rectifiers, Marker lights), Airports, Lighting equipment, Solid state physics, Taxiing, Silicon.

This report describes the development of a solid state lighting controller for use with up to 24 KW airport series lighting circuits. Silicon controlled rectifiers make possible continuous control of lights from zero to full brilliance utilizing less than 5 watts of control power. Tests were performed demonstrating compliance with the design specification. Since these units were designed to meet a variety of lighting loads it is recommended that a study be made of airport lighting requirements to determine the specification for an optimum modular unit which will best meet all requirements. An investigation should also be made to determine what modifications are required to permit operation of these units by radio signals as well as control cable signals. (Author)

AD-608 816 Div. 8
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
LOW-LOSS POLYFOAM DIELECTRIC CABLE. PART II. HIGH-FREQUENCY INVESTIGATION,
by William E. Mayo. Jul 64, 14p
Task 1G6 22001A057 04
USAEL TR2449

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Coaxial cables, Super high frequency), (*Radiofrequency cables, Dielectrics), Attenuation, Capacitance, Electrical impedance, Electric insulation, Velocity, Propagation, Electromagnetic waves, Moistureproofing, Polyethylene plastics, Plastic coatings, Expanded plastics, Copper, Silver, Plating, Design, Very high frequency.

A low-frequency evaluation of a redesigned commercial-type low-loss polyfoam dielectric cable intended for military application up to frequencies of 100 Mc was reported in Technical Report 2448, April 1964. This work led to further investigation of the redesigned cable up to frequencies of 10,000 Mc. The second report contains the results of an internal investigation into the stability of the electrical characteristics of this cable (RG-330 ( )/U) with respect to exposure to moisture. (Author)

AD-608 819 Div. 8
OTS Prices: HC $4.00/MF $1.00

Lincoln Lab., Mass. Inst. of Tech., Lexington.
INPUT CURRENT COMPENSATION FOR TRANSISTOR OPERATIONAL AMPLIFIERS,
by J. N. Harris and R. S. Orr. 28 Oct 64, 128p
LL-1964-31
Contract AF19 628 500
ESD TDR64 568

Unclassified report

Descriptors: (*Transistor amplifiers, Electric currents), (*Electric currents, Reduction), Circuits, Diodes, Thermistors, Mathematical analysis, Temperature.

The input current of transistor operational amplifiers limits their application for some uses. Several techniques are described which result in a substantial reduction of this input current. The resulting input current can range from 20% of the original current over a wide temperature span. The percentage reduction depends on the degree of complexity and precision of the compensating circuit used. One type of compensation uses a thermistor-resistor circuit. This technique is developed in detail--both analytically and experimentally, and various examples are given. For the case of a transistor having an input current of 50 nA, it is possible to design circuits to reduce this value to as little as 0.5 nA over a 50C temperature span. (Author)

AD-608 823 Div. 8
OTS Prices: HC $5.00/MF $1.00

Westinghouse Electric Corp., Washington, D. C.
HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Final development rept. for 29 Jun 62-31 Oct 64.
31 Oct 64, 153p
Contract NObsr87647, Proj. SR0080301, Task 9348

Unclassified report

Descriptors: (*Crystal rectifiers, Silicon), Crystal

growth, Encapsulation, Manufacturing methods, Semiconductor devices, Electronic switches, Design, Diffusion, Electrical properties, Impurities, Gallium, Aluminum, Silicon alloys, Gold alloys, Performance (Engineering).

The basic device and encapsulation designs for the 500-volt/500-ampere switch are given, and the device fabrication process outlined. The problems with silicon material for such a large area device are treated in detail since their solution or circumvention constituted a major portion of the program. Equivalent emphasis is given to device characterization since the 500-ampere current level - with all of its implications - is far in excess of commercially available silicon controlled rectifiers. Data are reported on fifty final device samples delivered to the Navy Department. These devices are the largest silicon controlled rectifiers ever fabricated and represent a tremendous advance in the state-of-art of semiconductor power switches. (Author)

AD-608 832 Div. 8
OTS Prices: HC $3.00/MF $0.75

Mitre Corp., Bedford, Mass.
THE PEAK GAIN AND SYSTEM PERFORMANCE OF A LARGE PARABOLOIDAL ANTENNA,
by B. M. Hadfield, J. B. Suomala, and P. L. Konop. Nov 64, 60p TM-03598/0000/01/0/00
Contract AF19 628 2390, Proj. 705
ESD TDR64 132

Unclassified report

Descriptors: (*Parabolic antennas, Performance (Engineering)), Gain, Telemetering antennas, Antenna configurations, Antenna components, Antenna radiation patterns, Systems engineering, Structural properties, Mechanical properties, Deformation, Illumination.

The characteristics that affect the practical operating gain of parabolic reflector-type antennas are discussed, not for design considerations, but to analyze for the systems engineer some of the factors involved in estimating practical performance under arbitrarily set conditions. The effects of structural design, mechanical tolerances and deformations, illumination, and other considerations on the gain of large antennas operating at relatively high frequencies are examined, using theory, graphic data, and an analysis of a typical case using a conventional 60-foot telemetry antenna as an example. The possible system performance degradation resulting from the use of existing large antennas in the new 2200 to 2300-mc telemetry band is discussed. (Author)

AD-608 849 Div. 8
OTS Prices: HC $2.00/MF $0.50

Warnecke Electron Tubes, Inc., Des Plaines, Ill.
RESEARCH AND DEVELOPMENT PROGRAM FOR X-BAND CROSSED-FIELD AMPLIFIER.
Quarterly engineering rept. for 28 Jun-12 Sep 64.
12 Sep 64, 50p
Contract NObsr89504, Proj. SF0100201, Task 9294

Unclassified report

Descriptors: (*X band, Amplifiers), (*Crossed field devices, Amplifiers), (*Amplifiers, X band), Radio-frequency, Electromagnetic fields, Attenuation, Beryllium, Aluminum, Oxides, Ceramic materials, Surface properties, Thermal conductivity, Delay lines, Niobium, Waveguides, Waveguide couplers, Delay circuits, Electron tubes, Electron tube parts, Electron guns, Design, Photoengraving, Sapphire, Copper, Titanium, Transmissions, Coupling circuits, Theory, Mathematical analysis.

At the end of the first year's work it was demonstrated that an X-band line can be made by photo-forming on the surface of an insulator. The fenced line (a dissymmetric multiple meander with edges closed) was found to have many advantages, but (1) the r-f fields were concentrated at the center, (2) dispersion was excessive for the broad band required here, and (3) transmission losses were too high. A multiple meander open at the edges is therefore to be used in further studies. A saphire support was chosen for the line; the principal disadvantage of ceramics was surface roughness. Work with beryllia ceramics is continuing because the thermal conductivity is important. Studies on other parts of the tube design have been undertaken: (1) support of the delay line in a niobium frame; (2) a stepped ridge to couple the delay line to the waveguide and avoidance of coupling to possible fast wave in the interaction space; (3) a high current density gun with a grid and other design features to reduce excess noise, and with a shield to keep r-f energy out of the cathode region. (Author)

AD-608 882 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE TRANSISTOR, VHF, SILICON, POWER (25W-100mc).
Quarterly rept. no. 8, 1 Apr-30 Jun 64,
by B. Rappaport. 30 Jun 64, 35p TRWS-3000:47-Q-8
Contract DA36 039sc86733

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-602 013.

Descriptors: (*Semiconductor devices, Manufacturing methods), (*Transistors, Manufacturing methods), Silicon, Titanium, Silver, Vapor plating, Quality control, Production, Very high frequency, Specifications, Industrial training, Operators (Personnel), Gain, Transistors amplifiers, Power, Metal coatings, Performance (Engineering), Processing.

Buildup of pilot line production and training of personnel has continued through this period. All processes are firmly established, but tighter controls are to be instituted on the contact metallizing operation. A tentative specification covering the 25-volt device design was agreed upon. This specification includes a single sideband performance requirement. Test results of fifty engineering samples of this device are given. (Author)

AD-608 883 Div. 8, 25, 26
OTS Prices: HC $2.00/MF $0.50

TRW Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. TRANSISTOR, VHF, SILICON, POWER (25W-100mc).
Quarterly rept. no. 9, 1 Jul-30 Sep 64,
by B. Rappaport. 30 Sep 64, 37p
Contract DA36 039SC86733

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.
See also AD-608 882.

Descriptors: (*Semiconductor devices, Manufacturing methods), (*Transistors, Manufacturing methods),

(*Silicon, Transistors), Very high frequency, Gain, Aluminum, Reliability (Electronics), Performance (Engineering), Distortion, Production, Specifications, Tables, Statistical data.

The last engineering samples were delivered and a final specification was established. The specification includes a single sideband performance requirement of 20 watts PEP, 7 db gain, 35% collector efficiency and -30 db intermodulation distortion. Aluminum is being substituted for titanium-silver in the metal contacts in order to increase the device reliability. Changes are being made in the coldweld die to improve the capping operation yield. (Author)

AD-608 898 Div. 8
OTS Prices: HC $3.00/MF $0.75

Microwave Associates, Inc., Burlington, Mass.
MAGNETICALLY CONTROLLED GAS DUPLEXER.
Final rept. for 27 Feb 63-27 May 64,
by Charles S. Ward. Oct 64, 62p
Contract AF30 602 2960, Proj. 5573, Task 557301
RADC TDR64 364
Unclassified report

See also AD-604 755.

Descriptors: (*Electron tubes, Microwave equipment), (*Radar duplexers, Gas discharges), (*Discharge tubes, Radar duplexers), (*Radar equipment, Magnetic pinch), Switching circuits, Electric switches, Magnetic fields, S band, Waveguides.

An investigation is described leading to the development of a high power microwave gas duplexer utilizing a fixed external magnetic field to improve switching efficiency within the limit of a specified recovery time. The magnetic field is transverse, i.e., perpendicular to both the microwave electric field and the narrow waveguide sidewalls, and parallel to the axis of the discharge tube. It is shown that under appropriate conditions such a field simultaneously produces substantial reductions in both recovery time and discharge arc loss. A prototype duplexer utilizing this effect and designed to operate at 50 megawatts peak-100 kilowatts average in S-band is described. (Author)

AD-608 905 Div. 8, 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
THE PRESSURE CHARACTERISTIC OF MICROWAVE BREAKDOWN,
by P. Molmud. 1958, 11p STL/GM-47.4-13
Unclassified report

Descriptors: (*Barometric pressure, Radiofrequency frequency), (*Microwave frequency, Guided missile antennas), (*Guided missile antennas, Radiofrequency interference), (*Antennas, Microwave frequency), Theory, Attenuation, Electrons, Equations, Functional analysis, Electric Field, X Band, Electron density, Atmospherics, Atmospheric electricity, S Band.

Missiles under current development carry a wide variety of antennae operating over a fairly wide range of frequencies and power. The efficiency of these antennae may be disturbed by the rocket exhaust or by microwave breakdown. In the case of such distrubance, an examination of the altitude dependence of the signal dropout will determine whether or not microwave breakdown is the cause. If the signal loss is due to microwave breakdown then the disturbance will have a maximum at a missile altitude which is characteristic of the wave frequency employed. For example, X band (10,000 mc.) signal loss will be maximized at 115,000 ft (5 mm.) and S band (3,000 mc.) at 131,000 ft (2.5 mm.). As far as this author is aware there is no data available on the pressures or altitudes which will maximize microwave breakdown for frequencies other than X and S bands. On account of the obvious utility of such information we endeavor in this note to outline a theory which will predict such pressures for any frequency. (Author)

AD-608 906 Div. 8
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
CAPACITOR PLATE SHAPE PROBLEM,
by Glen Culler and Lee Heflinger. 8 Feb 57, 6p
RW(ARL)-7-3
Unclassified report

Descriptors: (*Capacitors, Configuration), Sandwich construction, Thickness, Boundary value problems, Design, Voltage.

A capacitor is to be constructed consisting of a stack of parallel plates. The shape of the individual plates is determined so that the potential gradient will be constant along the surface of the plates.

AD-608 910 Div. 8
OTS Prices: HC $2.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
PREPARATION AND EVALUATION OF VACUUM-DEPOSITED NICKEL-CHROMIUM THIN-FILM RESISTORS,
by I. H. Pratt and J. J. McCarthy. Jul 64, 50p
Task 1GO 24401A112 04
USAEL TR2418
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Resistors, Metal films), (*Metal films, Resistors), Microminiaturization (Electronics), Interferometers, Evaporators, Chromium alloys, Nickel alloys, Aluminum compounds, Oxides, Vacuum apparatus, Vapor plating, Resistance (Electrical), Cleaning, Glass, Solid state physics, Equations.

Results of studies of some properties of thin film nickel-chromium resistors are presented. Nichrome (80% Ni, 20% Cr) was vacuum evaporated and deposited through masks in 5, 10, 20 and 40 mil wide strips onto various planar substrates with different surface characteristics, (e.g., glass, mylar, micro-module alumina wafers). The following parameters and their interdependencies were measured and studied: sheet resistivity (ohms per square), film thickness, aging conditions (post deposition static heat treatment), substrate surface and material, temperature coefficient of resistance, film temperature under various conditions, effect of line width and sheet resistivity on maximum power dissipation, statistical distribution and spread for some of these parameters, as a criterion for the degree of their reproducibility and controllability. (Author)

9. Fluid Mechanics

AD-608 543 Div. 9, 15
OTS Prices: HC $3.00/MF $0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
COMPARISON OF FINITE DIFFERENCE EXPRESSIONS USED IN LAGRANGIAN FLUID FLOW CALCULATIONS.
Rept. for 30 Sep 62-24 Jun 64,
by W. Herrmann. Nov 64, 58p ASRL-TR-106-4
Contract AF29 601 4601, Proj. 5776, Task 577601
WL TR64 104

Unclassified report

Descriptors: (*Fluid flow, Numerical analysis), (*Difference equations, Numerical analysis), Equations of state, Differential equations, Momentum, Transport properties, Taylor's series, Differential geometry, Fluid mechanics, Green's function.

A number of commonly used finite-difference analogs to partial derivatives in two space dimensions were investigated, and a few variations were proposed. The accuracy of these analogs was assessed by obtaining numerical results for deformations for which the analytical gradients can be evaluated. None of the analogs appeared superior for those deformations which were investigated, and it appears that a choice may be made on the basis of computational convenience. (Author)

AD-608 584 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

Space Technology Labs., Inc., Los Angeles, Calif.
MAGNETIC FIELD EFFECTS ON BOW SHOCK STAND-OFF DISTANCE,
by Richard W. Ziemer and William B. Bush. 16 May 58, 6p STL/GM-TR-0127-00396
Contract AF04 647 127

Unclassified report

Descriptors: (*Shock waves, Magnetic fields), (*Gas ionization, Shock waves), Bodies of revolution, Blunt bodies, Plasma medium, Electrical conductance, Nonlinear differential equations.

Combined theoretical and experimental investigations were carried out to find the effects of a magnetic field on the shock wave stand-off distance of an unyawed blunt body of revolution. Under the experimental conditions, the stand-off distance was found to increase with increasing field strength. The predicted behavior agreed quite well with the experimental findings.

AD-608 590 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
SCATTERING OF SURFACE WAVES BY A SUBMERGED CIRCULAR CYLINDER.
Technical rept. no. 3,
by Harold Levine. 20 Nov 64, 42p
Contract Nonr225 74, Proj. NR0 41 313

Unclassified report

Descriptors: (*Fluid mechanics, Incompressible flow), (*Cylindrical bodies, Fluid dynamic properties), Scattering, Velocity, Potential theory, Boundary value problems, Harmonic analysis, Conformal mapping, Green's function, Integral transforms, Series, Bessel functions.

The effect of a rigid circular cylinder, wholly immersed within and lying parallel to the free surface of an incompressible and inviscid fluid, on straight-crested surface waves passing overhead is investigated. A mode of analysis is developed, on the hypotheses of small amplitude and time-periodic fluid motions, that encompasses all directions of incidence of the primary wave; and is used to extend results previously obtained in the case of normal incidence. It is shown, in particular, that the absence of surface wave reflection at normal incidence gives way to a partial reflection for other primary directions, which in turn verges on completeness as the direction of the incoming wave becomes more closely aligned with that of the cylinder axis. (Author)

AD-608 592 Div. 9, 25
OTS Prices: HC $1.00/MF $0.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
INTERACTIONS BETWEEN HYDROGEN AND OXYGEN ATOMS AND SURFACES.
Final rept. for 1 Oct 62-31 Oct 64,
by Joe N. Smith, Jr. 23 Oct 64, 23p GA-5762
Contract AF49 638 1192, Proj. 309
AFOSR 64 2388

Unclassified report

Continuation of Contract AF49 638 356.
Research continuing under Contract AF49 638 1435.

Descriptors: (*Particle beams, Superaerodynamics), (*Superaerodynamics, Particle beams), (*Hydrogen, Particle beams), (*Oxygen, Particle beams), Molecular beams, Ionization gages, Evaporators, Thermodynamics, Crystal structure, Vapor plating, Metal films, Nickel, Silver, Gold, Surfaces, Dizag.

The ultimate goal of the research is to provide data concerning the transfer of energy and momentum between atoms and molecules and a solid surface in free molecule flow, and to investigate other processes that may occur in the gas-surface interaction. The program was conducted to provide the necessary boundary conditions to be used in the calculation of aerodynamic drag coefficients in rarefied gas flow. The modifications of the basic modulated atomic-beam machine used in the experiments are summarized. The general experimental method is discussed in some detail; however, experimental results are only outlined as the bulk of the work has been published previously; abstracts of these publications are included as appendices.

AD-608 593 Div. 9
OTS Prices: HC $2.00/MF $0.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ON THE ASSUMPTION OF SPECIFIC-HEAT RATIO NEAR ONE IN THE THEORY OF HIGH-ENERGY GAS FLOWS,
by F. K. Moore. Nov 64, 30p CAL-AF-1285-A-12
Contract Nonr2653 00

Unclassified report

Descriptors: (*Gas flow, Specific heat), (*Hypersonic flow, Specific heat), Shock waves, Gas ionization, Dissociation, Excitation, Boundary layer, Sound, Sonic boom, Nonequilibrium flow, Thermodynamics, Heat transfer.

The assumption that the ratio of specific heats is near one is of dominant importance in real-gas flow theory for hypersonic shock layers, scaling for dissociating flows, local similarity of the hypersonic boundary

layer, and the theory of weak disturbances of a highly excited gas. Certain of these problems are briefly reviewed, chiefly to explain the advantages conferred by this assumption which, though poor a priori, has the power to unify diverse problems, often with surprising accuracy. Special attention is paid to the real-gas theory of sound waves, showing how a reduction of order is achieved for any process of energy release coupled with a state variable. Dispersal by chemical relaxation and by radiative transfer are described as examples. (Author)

AD-608 608 Div. 9
OTS Prices: HC $1.00/MF $0.50

Ohio State Univ. Research Foundation, Columbus.
EXPLORATORY INVESTIGATION OF LAMINAR BOUNDARY LAYER HEAT TRANSFER CHARACTERISTICS OF GAS LIQUID-SPRAY SYSTEMS.
Interim technical rept.,
by A. N. Tifford. Sep 64, 23p
Contract AF33 616 6503, Proj. 7063, Task 706301
ARL 64 136
Unclassified report

Descriptors: (*Sprays, Heat transfer), (*Heat transfer, Laminar boundary layer), Laminar flow, Surface properties, Two-dimensional flow, Drops, Fluid dynamic properties, Mathematical analysis, Gases, Liquids, Friction.

On the basis of an assumed two-dimensional model for the two-phase boundary layer on a body exposed to a gas stream containing liquid drops, an approximate analysis is made of the surface effects occuring with laminar flow. Some of the findings are: (1) Surface rates of heat transfer in an air stream may be increased more than thirtyfold by water drop injection. (2) The surface friction and heat transfer rate always decrease initially with increasing liquid 'catch' rates. (3) When the impinging drops have retained at least a little of the local free stream tangential velocity and/or temperature level, minima and maxima occur in the surface friction and/or heat transfer rate, respectively as the liquid 'catch' rate increases. (4) The minima in the surface boundary layer characteristics are so close to unity and occur at such infinitesimal, corrected 'catch' rates for the liquids studied, that, in effect, they don't exist for practical purposes. Instead, the surface characteristics seem to initially increase linearly with the liquid ingestion rate. (Author)

AD-608 657 Div. 9, 12
OTS Prices: HC $2.00/MF $0.50

North American Aviation, Inc., Downey, Calif.
RADIATIVE FLOWS ABOUT CONES AND WEDGES,
by James J. Der. 16 Oct 64, 32p SID-64-1817
Unclassified report

Descriptors: (*Aerodynamic configurations, Aerodynamic heating), (*Fluid mechanics, Aerodynamic configurations), Conical bodies, Wedges, Scientific research, Reentry vehicles, Atmosphere entry, Heat transfer, Gas flow, Equations of state, Differential geometry, Energy, Momentum, Perturbation theory, Radiation damage, Numerical analysis, Integrals, Differential equations, Aerodynamic characteristics.

Radiative flows about reentering interplanetary vehicles are studied by the analysis of flows past cones and wedges using optically-thin gray gas assumptions. A numerical procedure based on the one-layer method of integral relation of Dorodnitsyn is described, and analytical solutions are presented. The analysis is applicable for gases at equilibrium or frozen conditions. (Author)

AD-608 677 Div. 9, 25
OTS Prices: HC $4.00/MF $0.75

Rosemount Aeronautical Labs., Univ. of Minnesota, Minneapolis.
AN EXPERIMENTAL INVESTIGATION OF IMPACT AND SHOCK-WAVE BREAK-UP OF LIQUID DROPS.
Final rept.,
by A. R. Hanson, E. G. Domich, and H. S. Adams.
15 Nov 55, 106p
Unclassified report

Supported by the U. S. Navy, Bureau of Aeronautics.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Drops, Separation), (*Sprays, Analysis), Shock waves, Velocity, Shock tubes, Deformation, Silicone plastics, Oils, Collecting methods, Impact shock, Numerical analysis, Water, Alcohols.

The report describes an experimental investigation into the matter of evaluating sprays. Two particular aspects of the problem were studied: 1) impact break-up of drops when the spray is sampled by means of coated slides, and 2) drop break-up associated with shock waves. The first phase of the work made use of glass slides coated with highly viscous silicone oils to sample individual drops. An empirical equation was established which specifies critical impact velocities for water drops whose diameters lie in the range 350-2270 microns. Extrapolation to smaller drops gives plausible values of critical velocities. The second aspect of the problem was studied in a shock tube. New results were obtained with water and methyl alcohol in the 100-700 micron range of drop diameters. Apparatus was developed which is believed capable of studying shock break-up of considerably smaller drops, perhaps down to 25 microns in diameter. (Author)

AD-608 691 Div. 9
OTS Prices: HC $2.00/MF $0.50

Electro-Optical Systems, Inc., Pasadena, Calif.
A PROBLEM IN TURBULENT REACTING GAS DYNAMICS.
Research rept.,
by Saul Feldman. Mar 62, 36p EOS-RR-5
Contract DA04 495ORD3245, ARPA Order 203 61
Unclassified report

Descriptors: (*Gas flow, Turbulence), (*Turbulence, Gas flow), Shock waves, Chemical reactions, Reaction kinetics, Pressure, Thermodynamics, Statistical functions, Differential geometry, Turbulent boundary layer, Laminar boundary layer, Wake, Blunt bodies, Hypersonic characteristics, Equations, Dynamics.

The case of a stream tube of cold gas going through a strong normal shock wave is treated. Chemical reaction is allowed to occur downstream of the shock, where the pressure and the distribution of certain turbulent correlation functions are prescribed as a function of distance. It is shown that the turbulence modifies the flow field mainly through the effects it has on the reaction rates leading to a hotter gas than if just the mean values of the thermodynamic functions for the turbulent flow were considered. The Gibbs' function for the fluid is also modified by the turbulent fluctuations, thus leading to different final equilibrium conditions. (Author)

AD-608 702 Div. 9, 1
OTS Prices: HC $3.00/MF $0.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
THE FLUTTER OF VERY LOW ASPECT RATIO PANELS,
by Earl H. Dowell. Jul 64, 93p ASRL-112-2
Grant AF AFOSR62 363
AFOSR 64-1723

Unclassified report

Descriptors: (*Panels (Structural), Aeroelasticity), (*Flutter, Flat plate models), Aerodynamic characteristics, Gas flow, Numerical analysis, Flight, Stability, Aspect ratio, Airplane panels.

The aeroelastic stability of an infinitely long panel of finite width with the upper surface exposed to an inviscid flow is examined. The panel behavior is accounted for by small deflection plate theory while the aerodynamic forces acting on the panel are described by the classical linearized, potential theory. The panel is assumed to be simply-supported along the side edges, although other edge conditions may be considered in a similar manner (e.g. clamped edges). For a panel whose length is long compared to the critical wavelength, the present model should adequately describe, at least in an asymptotic sense, the stability boundary. It is shown that the critical wavelength is approximately twice the panel width and thus the present results should be valid approximations for a panel of finite length whose length is much greater than its width. Rather extensive numerical results were obtained for flutter velocity. (Author)

AD-608 705 Div. 9, 4, 25
OTS Prices: HC $1.00/MF $0.50

Cincinnati Univ., Ohio.
STUDY OF BURGERS' EQUATION OF THE KINETIC THEORY FOR A REACTING GASEOUS MIXTURE.
Technical rept.,
by Ting Yi Li. Jul 64, 17p AE-6402
Contract Nonr2168 03

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Kinetic theory, Differential equations), (*Nonequilibrium flow, Chemical reactions), Gases, Mixtures, Diffusion, Transport properties, Thermochemistry, Quantum mechanics.

Sometime ago Burgers obtained an extended form of the Boltzmann equation which adequately takes into account of chemical reactions and diffusion in a realistic kinetic model of the reacting gaseous mixture. By certain approximate arguments, this Burgers' equation can be reduced into a simplified model equation. This simplified model equation is formally in agreement with an earlier equation also proposed by Burgers. (Author)

AD-608 712 Div. 9
OTS Prices: HC $2.00/MF $0.50

Heliodyne Corp., Los Angeles, Calif.
STABILITY OF DUST LADEN TWO-DIMENSIONAL LAMINAR WAKES.
Research rept. no. 6,
by Ali Hasan Nayfeh. Oct 64, 48p
Contract DA04 495AMC458Z, ARPA Order 360

Unclassified report

Rept. on Proj. DEFENDER.

Descriptors: (*Dust, Wake), (*Wake, Laminar flow), (*Laminar flow, Wake), Two-dimensional flow, Compressible flow, Fluid mechanics, Stability, Equations, Motion, Damping, Relaxation time, Perturbation theory.

The stability of two-dimensional compressible dusty wakes is investigated. An equation is derived for the amplitude of the pressure disturbance. The solution of this equation is sought by perturbing the dust-free solution for small mass fraction of dust to gas. The straightforward perturbation expansion is not uniformly valid far away from the wake axis. A second-order uniformly valid solution is obtained. The results show that the dust can be stabilizing as well as destabilizing, depending on the size of the particles and their distribution. For a uniform distribution of dust and for very small particle size, the dust has a destabilizing effect. As the dust size increases, the destabilizing effect increases to a maximum, and then decreases to zero. As the particle size increases further, the dust will have a stabilizing effect. The quantitative stabilizing or destabilizing effect of the dust depends on the velocity defect and temperature excess at the wake axis. (Author)

AD-608 828 Div. 9
OTS Prices: HC $3.00/MF $0.75

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
NONEQUILIBRIUM LAMINAR BOUNDARY LAYER FLOW OF IONIZED AIR.
Technical Information series,
by F. G. Blottner. Nov 64, 77p R64SD56
Contract AF04 694 486

Unclassified report

Paper presented at the AIAA Aerospace Sciences Meeting, N. Y., N. Y., January 20-22, 1964.
Declassified 26 Nov 63.

Descriptors: (*Air, Laminar boundary layer), (*Laminar boundary layer, Air), (*Wake, Gas ionization), Laminar flow, Conical bodies, Reentry vehicles, High temperature research, Electron density, Chemical reactions, Transport properties, Stagnation point, Electormagnetic waves, Propagation, Numerical analysis, Difference equations Partial differential equations.

A study of non-equilibrium ionized multi-component air laminar boundary layer on a cone-shaped body at high velocity and temperature is made. The method of analysis utilizes a non-similar development of the boundary layer by finite difference scheme. The results of this investigation shows that electron density of the order of 10 to the 7th power to 10 to the 10th power electron/cc. can be generated by the viscous dissipation in the boundary layer. This investigation also shows the importance of considering the non-equilibrium aspects of the flow rather than the limiting cases of frozen or equilibrium flow. The study of the chemical reactions show that atomic oxygen is mainly produced from the dissociation of molecular oxygen while atomic nitrogen results mainly from two of the shuffle reactions. The production of nitric oxide comes from the shuffle reactions. For distances up to 15 ft. downstream from the tip and for conditions considered, none of the chemical reaction are near equilibrium. (Author)

AD-608 829 Div. 9
OTS Prices: HC $4.00/MF $1.00

Bell Aerosystems Co., Buffalo, N. Y.

NONLINEAR THERMOELASTIC EFFECTS ON HYPERSONIC STABILITY AND CONTROL. PART I, VOLUME 2. AERODYNAMICS,
by James R. Batt. Sep 64, 142p
Contract AF33 657 7486, Proj. 8219, Task 821901
FDL TDR64 16 P1 V2

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Aerothermoelasticity, Hypersonic flow), (*Airfoils, Aerodynamic characteristics), Stability, Control, Nonlinear systems, Graphics.

The curves presented in this volume of the final report are to be used to obtain aerodynamic influence coefficient matrices for slender two-dimensional airfoils in hypersonic inviscid flow. Influence coefficients are presented for ten airfoil shapes as a function of thickness ratio, Mach number and geometric angle of attack. (Author)

AD-608 830 Div. 9, 12
OTS Prices: HC $7.40/MF $2.25

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
HEAT TRANSFER MEASUREMENTS AT MACH 8 ON AN AERODYNAMICALLY CONTROLLABLE WINGED RE-ENTRY CONFIGURATION. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Lawrence Meckler. Sep 64, 438p
Contract AF33 616 8130, Proj. 8219, Task 821902
FDL TDR64 142

Unclassified report

Descriptors: (*Reentry vehicles, Heat transfer), (*Hypersonic flow, Aerodynamic configurations), Cylindrical bodies, Delta wings, Aerodynamic control surfaces, Angle of attack, Reynolds number, Models (Simulations), Flaps, Fins, Wind tunnels, Graphics.

Heat transfer data were obtained at Mach 8 for a winged re-entry configuration with several types of aerodynamic controls. The basic model consisted of a clipped delta wing with an overslung cone-cylinder body. Most of the tests were conducted with partial span trailing edge flaps. The effects of tip fins, a hemisphere-cylinder body, a full span trailing edge flap, and a full span, plug-type, trailing edge spoiler were also investigated. The partial span flap deflection were varied between ± 39 degrees in an angle of attack range of ±20 degrees. Selected configurations were used to examine the angle of attack ranges of -30 degrees to -50 degrees and + 30 degrees to + 50 degrees. The major portion of the program was conducted at a unit test section Reynolds number of 3.3 x 10 to the 6th power/ft with limited comparative testing being done at a unit test section Reynolds number of 1.1 x 10 to the 6th power/ft. (Author)

AD-608 837 Div. 9
OTS Prices: HC $3.00/MF $0.75

Boeing Scientific Research Labs., Seattle, Wash.
DISTRIBUTION OF TURBULENT ENERGY AND CONCENTRATIONS AT LARGE WAVE NUMBERS,
by Yih-Ho Pao. Aug 64, 80p D1-82-0369, FSL-90

Unclassified report

Also available from the author.

Descriptors: (*Fluid flow, Turbulence), (*Turbulence, Energy), Functional analysis, Viscosity, Measurements, Tables, Equations, Reynolds number, Anemometers.

For large Reynolds and Peclet numbers, mechanisms for the spectral transfer of turbulent energy and concentration at large wave numbers are proposed. Based on these mechanisms, the turbulent energy spectrum function and the turbulent concentration spectrum functions of species with arbitrary Schmidt numbers are deduced for the whole universal (equilibrium) range. The resulting one-dimensional energy and concentration spectra are compared with experiments. (Author)

AD-608 860 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
AN EXACT ANALYSIS OF LAMINAR MAGNETOHYDRODYNAMIC FLOW IN THE ENTRANCE REGION OF A FLAT DUCT,
by R. Manohar. Sep 64, 26p MRC-TSR-509
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Magnetohydrodynamics, Laminar flow), (*Laminar flow, Numerical analysis), Fluid flow, Magnetic fields, Incompressible flow, Viscosity, Nonlinear differential equations, Motion, Ducted bodies, Numerical methods and procedures, Hydrodynamics.

A numerical method for obtaining solutions of laminar boundary layer equations for incompressible fluids due to Hartree has been modified here to obtain solutions of the problem of laminar flow of a conducting fluid with constant properties in the entrance region of a semi-infinite flat duct with a transverse magnetic field. The non-linear equations governing the flow in the entrance region are solved numerically for various values of Hartmann numbers and the corresponding velocity profiles, pressure distribution and inlet length are obtained. The same method can be applied to other problems of similar nature. (Author)

AD-608 861 Div. 9
OTS Prices: HC $4.00/MF $0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
BLAST WAVE THEORY,
by Akira Sakurai. Sep 64, 101p MRC-TSR-497
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Shock waves, Mathematical analysis), Partial differential equations, Iterative methods, Series, Mechanical waves, Propagation, Fluid mechanics, Acoustics, Mathematical models, Gases, Dynamics.

A method to find approximate solution of an idealized model of the blast wave problem is developed, the gasdynamic motion is initiated by an instantaneous energy release from a point source (or line, or plane source). Transformation of variables is introduced with a similarity parameter x as an independent variable along with a quantity less sensitive to the phenomenon. This reduces the fundamental system of equations of the problem to a manageable form for the approximation, which is conveniently performed in a power series expansion in the variable y and the coefficients of the expansion can be determined successfully from the systems of ordinary differential equations. The method has been applied to many problems of the similar type,

with some modifications necessary for each case, to blast wave, the propagation of the blast wave in the non-uniform medium, exploding wire phenomenon, magnetohydrodynamics cavitation and thunder. (Author)

AD-608 869 Div. 9
OTS Prices: HC $2.00/MF $0.50

Aerodynamic Lab., Ohio State Univ. Research Foundation, Columbus.
AN EXPERIMENTAL STUDY OF REAL GAS EFFECTS ON SHOCK DETACHMENT DISTANCES AND SHOCK SHAPES FOR A FAMILY OF BLUNT AXISYMMETRIC BODIES.
Interim technical rept. no. 4, 1 Jan 63-1 Feb 64,
by Bruce C. Graber. Oct 64, 47p
Contract AF33 657 10416, Projs. 1426, 1580,
Task 142604
FDL TDR64 130

Unclassified report

Descriptors: (*Blunt bodies, Shock (Mechanics)), (*Gas flow, Blunt bodies), Spheres, Supersonic flow, Geometric forms, Enthalpy, Supersonic flow, Hypersonic flow, Shock waves, Stagnation point, Ionization, Dissociation.

Shock shapes and detachment distances for spherical-nosed bodies are presented and analyzed. The experimental data were obtained by testing the models in an arc-driven shock tube facility which produces a high enthalpy supersonic flow behind the traveling normal shock. The free-stream conditions with respect to the model were such that the equilibrium density ratio across the bow shock and the free-stream Mach number vary as $3.1 < \text{or} = k < \text{or} = 7.2$ and $2.1 < \text{or} = M2 < \text{or} = 3.54$, respectively. The stagnation enthalpy range for the tests (2,000-31,000 BTU/lb(m)) allowed for free-stream dissociation and ionization levels of up to 88.0 per cent and 25.0 per cent, respectively. The handling of the data is somewhat different than usual in the type of quantities needed in the correlation procedure. It is demonstrated that the density ratio across the bow shock is the important parameter for correlating the nose region shock shapes since this produces agreement between the real gas data and perfect gas data. It is also demonstrated that detachment distance may be dependent on the level of free-stream dissociation while the nose region shock shape shows no dependence whatsoever on the degree of gas dissociation or ionization ahead of or behind the bow shock.

AD-608 870 Div. 9, 12
OTS Prices: HC $2.00/MF $0.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
LATE-STAGE EQUIVALENCE AND SIMILARITY THEORY FOR ONE-DIMENSIONAL IMPACTS,
by John K. Dienes. 10 Nov 64, 32p GA-5755
Contract DA04 495AMC116X

Unclassified report

Preprint of a paper to be presented at the Seventh Hypervelocity Impact Symposium, Tampa, Florida, November, 1964 and to be published in the Proceedings.

Descriptors: (*Impact shock, Hypervelocity projectiles), (*One-dimensional flow, Shock waves), Numerical analysis, Equations of state, Equations, Motion, Energy, Momentum, Boundary value problems.

Slabs impacting on a semi-infinite target are shown to induce a one-dimensional shock-wave system which can be described analytically if the target has a perfect-gas equation of state. The flow is of the similarity type at late times, and a hydrodynamic code example is used to demonstrate that flows which are not initially self-similar become so asymptotically. The exact solution for a perfect-gas equation of state whose ratio of specific heats is 7/5 is discussed, and it is shown that the product of energy and momentum for the flow is constant and equal to the product for the impacting slab. Hence, all impacts with the same value of this product are equivalent at late times. The explanation of this result in terms of the free surface condition is shown. The solution for general specific-heat ratios is obtained by relating it to other one-dimensional analytical work. (Author)

AD-608 879 Div. 9
OTS Prices: HC $2.00/MF $0.50

Cornell Univ., Ithaca, N. Y. Graduate School of Aeronautical Engineering.
SHOCK PROFILES IN HYPERSONIC FLOW OF A RELAXING GAS ABOUT A WEDGE,
by Frederick R. Dressler. Feb 61, 40p
Contract AF49 638 544
AFOSR 263

Unclassified report

Descriptors: (*Hypersonic flow, Wedges), (*Shock (Mechanics), Hypersonic flow), (*Gas flow, Two-dimensional flow), (*Wedges, Hypersonic flow), Aerodynamic configurations, Fluid flow, Shock waves, Dissociation, Thermodynamics, Perturbation theory, Transformations (Mathematics), Equations of state.

A small-perturbation technique is used to give the change in the shock inclination on a thin wedge in steady, two-dimensional, hypersonic flow. This change in shock angle is due to either dissociation or a lagging vibrational heat capacity in the flow behind the bow shock-wave. The problem is solved by transferring the physical domain into a 'piston' plane with one less space dimension. The resulting unsteady, one-dimensional problem is solved here. A general result is obtained giving the shock perturbation as a function of the unperturbed-flow parameters, body shape and equilibrium conditions behind the shock. An expression for the final shock inclination is given in closed form. (Author)

AD-608 888 Div. 9, 25
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN EXPERIMENTAL STUDY OF THE ENERGY EXCHANGE IN THE COLUMN OF AN ELECTRIC ARC WITH RADIAL GASFLOW INTERACTION.
Master's thesis,
by Harold F. Elliott and Raymond V. Gomez.
Aug 64, 87p
AFIT GE/EE/64 6

Unclassified report

Descriptors: (*Electric arcs, Energy), (*Electric discharges, Energy), Gas flow, Direct current, Nitrogen, Enthalpy, Temperature, Heat transfer, Nozzle gas flow, Anodes.

An arc device is used to study the effects of radially injecting nitrogen gas into the column of a DC arc. The device consists basically of a single tungsten cathode, a six-element copper anode, and a copper constrictor with an adjustable axisymmetrical radial gas injection jet. All elements are watercooled. The assumption is made

that the cathode and anode fall regions are not affected by the gas injection. The power transferred to the gas is determined by measuring the increased power input to the arc device during gas injection and making an appropriate correction for the heat lost in the constrictor. The mass flow of the nitrogen is monitored by a locally constructed coiled capillary flowmeter. Injection velocities are varied from zero to sonic. For arc powers in the range of 7-28 kw and mass flows up to 10 lbm/hr, gas enthalpies as high as 9000 Btu/lb are attained with a device efficiency up to 63 per cent. Approximate average gas temperatures are from 5300 to 7000 degrees K. The basic arc device is shown to be effective, although modification of the anode casing and the constrictor is suggested. (Author)

AD-608 904 Div. 9, 25
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.

THE SUPERFAST PINCH EXPERIMENT,
by Vernal Josephson. 2 Nov 59, 30p
STL/TR-59-0000-09880
Contract AF04 647 309

Unclassified report

Descriptors: (*Magnetic pinch, Tests), (*Deuterons, Acceleration), (*Magnetohydrodynamics, Tests), Hydrogen, Plasma sheath, Shock waves, Capacitors, Voltage, Electric discharges.

An assembly designed to accelerate deuterons to about 10kev by means of a radially converging magnetic piston has been constructed and tested. The emphasis in this report is on design features and operational problems encountered. Samples of experimental data are included to illustrate the assembly's behavior. Specifically, the assembly operates with 300kv on the condenser, the ringing frequency is 18mc, and present operation uses hydrogen gas at 50 microns. Both slow and fast pinches have been observed, the former being possibly thermal shock waves, and the latter being associated with inward motion of the plasma sheath.

10. Fuels and Combustion

AD-608 566 Div. 10, 27
OTS Prices: HC $1.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE EFFECT OF NON-EQUILIBRIUM FREE-RADICAL CONCENTRATION ON IGNITION DELAY IN THE HYDROGEN-AIR SYSTEM,
by R. P. Rhodes. Nov 64, 9p
Contract AF40 600 1000, Proj. RW2409
AEDC TDR64 241
Unclassified report

Descriptors: (*Free radicals, Chemical reactions), (*Ignition lag, Combustion), Supersonic characteristics, Gas flow, Hydrogen, Air, Reaction kinetics, Temperature, Time.

This report presents a theoretical discussion of the effect of nonequilibrium quantities of free radicals on the ignition delay in the hydrogen-air system. A correlation was found between the ignition delay computed from complete reaction kinetics and the initial rate of the reaction O2 + H = OH + O. A rate equation is derived in which a modified expression for the total free radical content is substituted for the H concentration. The implications of non-equilibrium amounts of free radicals on the testing and operation of high velocity combustion systems are discussed. (Author)

AD-608 734 Div. 10, 4, 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CHEMICAL COMPOSITION OF MICROIMPURITIES IN JET FUELS FROM SULFUROUS PETROLEUM,
by V. N. Zrelov, and N. I. Marinchenko.
19 Nov 64, 11p
FTD TT64 392; TT 65 60406
Unclassified report

Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) 1963, v. 8, no. 11, p. 57-61.

Descriptors: (*Jet engine fuels, Impurities), (*Petroleum, Impurities), Sulfur, Fuel filters, Minerals, Tar, Water, Sulfur compounds, Oxygen compounds, Storage, Handling, USSR.

The microimpurities of the jet fuels from sulfurous petroleums consist of ash elements, tars, and 'structural' water. In the process of transportation, settling, and filtration of the fuels there occurs a separation of the microimpurities in accordance with their chemical composition. The microimpurities saturated with ash elements settle and are filtered out in the mesh filters of the airplanes. The microimpurities saturated with tar products and water basically remain in the fuel in the suspended state. Into the composition of the tarry part of the microimpurities of the fuels, along with oxygen compounds, there go up to 20--30% of oxidized compounds containing sulfur. In the process of the filtration of fuels there occurs a decrease in the quantity of compounds containing sulfur in the microimpurities of the fuels. The compounds with sulfur in the fuels are retained in the storage fabric filters and the airplane paper filters, for which reason the latter quickly become clogged. At the fuel storage places the basic amount of microimpurities containing sulfur is held back by the fabric filters of the 1st step in filtration. (Author)

AD-608 838 Div. 10
OTS Prices: HC $3.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
SOLID PROPELLANT MECHANICAL PROPERTIES INVESTIGATIONS.
Rept. no. 12 (Final), 1 Oct 63-1 Oct 64,
by Norman Fishman and James A. Rinde. 2 Dec 64, 75p
Contract AF04 611 9559, Proj. PRU4673
Unclassified report

Descriptors: (*Solid rocket propellants, Mechanical properties), Failure (Mechanics), Microstructure, Loading (Mechanics), Thermal properties, Humidity, Aging (Materials), Volume, Equations of state, Elasticity, Strain (Mechanics), Elastomers, Isocyanate plastics, Ammonium compounds, Perchlorates, Aluminum, Solid rocket propellant binders.

The most significant findings of the research program were: (1) Mechanical properties were interrelated by path-independent equations based on strain-energy-time functions; (2) an empirical failure envelope of log W(T/Tsub o) vs. log t/a sub T was found to be path-independent; (3) data taken at various humidity levels could be handled similarly to data taken at various temperatures; (4) it was found that propellant behavior could be described by equations from finite elastic theory; (5) results suggest that a criterion for uniaxial failure in a propellant of high solids content is a minimum lateral area governed by maximum packing density. (Author)

AD-608 908 Div. 10
OTS Prices: HC $1.00/MF $0.50

Douglas Aircraft Co., Inc., Santa Monica, Calif.
LIQUID HYDROGEN TRANSFER TEST REPORT,
by D. R. Brincka. 7 Jun 60, 25p SM-37500
Unclassified report

Descriptors: (*Fuels, Guided missiles), (*Liquid rocket fuels, Handling), (*Fluid flow, Liquid rocket fuels), Liquefied gases, Hydrogen, Cryogenics, Storage tanks, Fuel tanks, Tank vents, Temperature, Seals (Stoppers), Thermal insulation, Instrumentation, Test methods.

The feasibility of transferring liquid hydrogen at high flow rates was verified. The transfer rate for this test was in the range of 2500-3000 G.P.M. into an ambient (temperature) pipe line and missile tank. Pipe line bow did not exceed six (6) inches at the beginning of transfer and returned to approximately the original position shortly afterwards. This bow compares favorably with our previous experience flowing liquid oxygen at rates up to 1500 GPM where the maximum bowing reached zero (0) to two (2) inches on the same type transfer system. Missile tank top pressure reached a peak of 24 PSIG approximately 6.5 seconds after transfer was initiated. It decayed thereafter to a minimum of 1 PSIG at termination of flow. The integrity of the WS-315A designed seals and joints were verified at liquid hydrogen temperatures and nominal pressures (not exceeding 40 PSIG). The standard ASA raised face (Serrated) flanges using Kel-F gaskets proved adequate as a sealing means on the pipe line configuration. The flexatallic seals used on the vent valves, emergency drain valve and the main lox tank exit cone all provided satisfactory sealing at liquid hydrogen temperatures. The applicability of cryogenic design practices in relation to valves was demonstrated.

AD-608 911 Div. 10, 4
OTS Prices: HC $1.00/MF $0.50

Aerojet-General Corp., Sacramento, Calif.
DEVELOPMENT OF ELASTOMERS FOR USE IN NITROGEN TETROXIDE ROCKET SYSTEMS.

Monthly progress rept. no. 3, 15 Sep-15 Oct 59,
by E. M. Tomlinson. 7 Nov 59, 6p AGC-8160-03M-3
Contract AF04 645 8
AFBMD TN59

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket propellants, Elastomers), (*Elastomers, Vulcanization), (*Nitrogen compounds, Oxides), Gamma rays, Aging (Materials), Compatibility, Rockets, Materials.

During this period efforts to produce a gamma-radiation-vulcanized compound were continued. Further efforts to devise and produce chemically vulcanized compounds are in progress. The literature survey and the screening tests of commercial compounds and new materials for use in chemically vulcanized compounds are continuing. (Author)

11. Ground Transportation Equipment

AD-608 552 Div. 11, 9
OTS Prices: HC $2.00/MF $0.50

Army Tank-Automotive Center, Warren, Mich.
IMPROVING WHEELED VEHICLE WATER SPEED BY MEANS OF WHEEL SHROUDING,
by Anthony J. Rymiszewski. Jun 63, 39p
Projs. 5016 11 84400, 597 01 006
ATAC 8088; ATAC LL77

Unclassified report

Descriptors: (*Cargo vehicles, Model tests), (*Hydrodynamics, Cargo vehicles), Shrouded propellers, Vehicle wheels, Velocity, Propulsion, Water, Graphics, Military requirements.

Presented in this report are experimental results of scale-model tests performed in the Land Locomotion Laboratory River Simulator to investigate the effects of wheel shrouding on wheeled vehicle water speed. This investigation was initiated to determine and analyze the swimming ability of wheeled vehicles resulting from wheel shrouding. An unshrouded wheeled vehicle using its wheel drive system as its sole water propulsive agent was selected for this study. Experimental tests were performed using a self-propelled, one-eighth, scale model of the Truck, Cargo, 5-ton, 8x8, XM-453. The model tests showed that wheel shroud design could radically improve water performance to a value of seventy percent above the maximum in the unshrouded condition. Also, it was shown that improper wheel shrouding and/or worn tire treads decrease the propelling forces of submerged wheels and limit a vehicle's water velocity well below the available 'maximum.' (Author)

AD-608 553 Div. 11, 25
OTS Prices: HC $3.00/MF $0.75

Army Tank-Automotive Center, Warren, Mich.
PERFORMANCE ANALYSIS OF A DRIVEN NON-DEFLECTING TIRE IN SOIL,
by Zoltan J. Janosi. Jun 63, 56p
Projs. 5016 11 8440, 597 01 006
ATAC 8091; ATAC LL84

Unclassified report

Descriptors: (*Tires, Performance (Engineering), Soils, Motion, Mechanics, Surface properties, Deformation, Shear stresses, Stresses, Mathematical analysis, Equations, Friction, Trafficability.

This report presents the first semi-empirical solution suggested to describe the traction versus slip relationship for rigid wheels. The kinematics of a slipping wheel are analyzed and the results are used to express the shear deformation as a function of slip which in turn is utilized in a new shear stress-strain relationship. The shear stresses are expressed at every point of the tire-soil interface surface and integrated to obtain the traction. Other established information is also briefly discussed, in order to complete the description of the state-of-the-art. (Author)

12. Guided Missiles

AD-608 504 Div. 12
OTS Prices: HC $3.00/MF $0.75

Aerospace Technology Div., Library of Congress, Washington, D. C.
SPACECRAFT UTILIZING LIFTING REENTRY TECHNIQUE. PT. I. REENTRY AND RECOVERY OF SOVIET MANNED SPACE VEHICLES.
Comprehensive rept.,
29 Oct 64, 90p
ATD P64 60; TT 65 60128

Unclassified report

Rept. on surveys of Soviet-Bloc Scientific and Technical Literature.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Manned spacecraft, Atmosphere entry), (*Reentry vehicles, Manned spacecraft), (*USSR, Manned spacecraft), Design, Orbital trajectories, Control systems, Deceleration, Retro rockets, Space navigation, Recovery, Aerospace craft, Astronauts, Aerodynamic characteristics, Space flight, Landings, Ejection, Communication systems, Lunar surface vehicles, Recovery.

This comprehensive report is based on Soviet and Soviet-bloc open literature published in connection with the launchings of Soviet space vehicles. The analyst's conjectures on possible design principles utilized in the Vostok reentry systems are also contained in the report.

AD-608 546 Div. 12, 9, 10
OTS Prices: HC $3.00/MF $0.50

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
LARGE ELASTIC DEFORMATION OF THIN CYLINDRICAL TUBES,
by Jen-shih Lee. Oct 64, 46p GALCIT-SM-64-38
Grant AF AFOSR352 63

Unclassified report

Descriptors: (*Aeroelasticity, Cylindrical bodies), (*Cylindrical bodies, Rubber), (*Deformation, Cylindrical bodies), Differential equations, Bodies of revolution, Structures, Dynamics, Mathematical analysis, Pressure, Strain (Mechanics), Nonlinear differential equations, Algebra, Functions.

Considered is an elastic, incompressible, isotropic material whose constitutive law is specified by a strain-energy function W which is a function of two strain invariants I sub 1 and I sub 2. In the mathematical theory of large deformations of axially symmetrical elastic membranes, the governing equations are a set of nonlinear ordinary differential equations. Three types of deformation of thin circular cylindrical rubber tubes are discussed. In the first type a rubber tube is deformed into another circular cylindrical tube of different length and diameter by simultaneous inflation and extension of the tube. The second type of deformation considered is a stretching of the tube without internal pressure. The third type is a tube inflated by internal pressure, with or without a change in total length or end diameter. In these two types the deformed tube is a curved surface of revolution; the analysis is more complicated, and the calculations are restricted to Mooney-Rivlin materials.

AD-608 548 Div. 12, 9, 10, 27
OTS Prices: HC $2.00/MF $0.50

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
THE EFFECT OF WALL ELASTICITY AND SURFACE TENSION ON THE FORCED OSCILLATIONS OF A LIQUID IN A CYLINDRICAL CONTAINER. PART I. ANALYSIS,
by P. Tong and Y. C. Fung. Oct 64, 32p
GALCIT-SM-64-40
AFOSR 64 2019

Unclassified report

Descriptors: (*Aeroelasticity, Cylindrical bodies), (*Fuel tanks, Sloshing), (*Dynamics, Mathematical analysis), Structures, Elasticity, Surface tension, Liquids, Oscillation, Liquid fuel rockets, Potential theory, Matrix algebra, Calculus of variations, Differential equations, Stability, Algebra.

The stability of a fluid contained in a circular cylindrical tank with a flat, flexible bottom under a periodic axial excitation was studied. An analytical difficulty for the solution of the linearized equations in the form of infinite series was discussed. A variational approach is formulated. An approximate solution results in a pair of coupled ordinary differential equations with periodic coefficients. A method of handling the stability of the solutions of such a system of equation is presented. Numerical results will be discussed in a later article. (Author)

AD-608 629 Div. 12, 14, 17, 26
OTS Prices: HC $6.00/MF $1.25

Pratt and Whitney Aircraft, East Hartford, Conn.
SOLID FILM LUBRICATED BEARING RESEARCH PROGRAM.
Rept. for 1 May 63-30 Jun 64,
by Paul Brown, Roger M. Hawkins, M. Maguire, and M. Pitek. Oct 64, 209p PWA-2354
Contract AF33 657 10420, Proj. 8128, Task 812801
FDL TDR64 117

Unclassified report

Descriptors: (*Ball bearings, Environmental tests), (*Lubricants, Ball bearings), (*Power equipment parts, Ball bearings), Lubrication, Bearings, Feasibility studies, Radiation damage, Space environmental conditions, Neutrons, Aerospace craft, High temperature research, Tests, Heat-resistant metals and alloys, Powder metallurgy, Nickel alloys, Molybdenum compounds, Sulfides, Physical properties, Chemical properties.

The program discussed in this report was divided into two phases. The first phase consisted of analytical evaluations of potential bearing designs, solid lubricant materials and lubricant supply systems as applied to accessory-sized ball bearings. The second phase was devoted to laboratory determinations of lubricant materials tensile strength and thermal properties followed by evaluations of selected solid lubricant materials and bearings. These tests included friction and wear evaluations of both lubricant and bearing materials in a friction and wear rig; evaluations of full-scale bearings in atmospheric and vacuum environments at temperatures ranging from -249F to 1500F, at speeds up to 24,000 rpm for periods up to three hours; and vacuum-environment testing of bearings which had been exposed to a fast neutron dose of approximately 10 to the 17th power neutrons/sq cm (>1.0 MEV). Test results of this program indicated that no lubricant tested, regardless of the supply system used or conditions under which tested, showed any clear superiority when compared to other dry film lubricants. (Author)

AD-608 652 Div. 12
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
UNCERTAINTIES IN SATELLITE POSITION DUE TO SOLAR RADIATION PRESSURE EFFECTS,
by R. W. Jacobus. Nov 64, 32p TM-03993
Contract AF19 628 2390, Proj. 602
ESD TDR64 147

Unclassified report

Descriptors: (*Satellites (Artificial), Position finding), (*Solar wind, Aeronautics), Celestial mechanics, Orbital trajectories, Mathematical prediction, Errors, Tracking.

A simple formula for calculating the magnitude of solar radiation pressure is given, and the uncertainty in each of the terms is discussed. Worst-case positional deviations due to solar radiation pressure are calculated for one satellite pass under several sets of conditions. Complicating factors, such as earth shadow, body motion and reflected radiation, are discussed, and finally, the net worst-case uncertainties in predicted satellite position after one pass are estimated. (Author)

AD-608 667 Div. 12, 30
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
DEMONSTRATION AND SHAKEDOWN OPERATION PIGGYBACK KIT (DASOP).
Summary rept.,
by R. M. Dunbar. Nov 64, 10p Martin CR-64-219
Contract AF04 647 576

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Flight instruments), (*Flight instruments, Guided missiles (Surface-to-surface), (*Flight testing, Guided missiles (Surface-to-surface),, Guided missiles, Test equipment, Safety, Operation, Telemeter systems.

The Demonstration and Shakedown Operation Piggyback (DASOP) kit was conceived in order to obtain additional flight data during Titan II flights. The kit supplemented the normal Instrumentation and Range Safety System (IRSS) kit. It increased the possible data channel capability from 60 analog and 32 bi-level to 256 analog and 80 bi-level channels. The kit was also designed so that with a minimum of modifications, it could be utilized in other missiles. The DASOP kit, as flown, had the capability for obtaining all the common type measurements, such as pressure, current, voltage, temperature and bi-level (on-off) data. In addition, low pass filters were utilized to allow certain accelerometer data to be obtained. It can be concluded that the DASOP Kit resulted in completely satisfactory data with an overall data recovery percentage for the four DASOP flights of 98 percent. It was also proven that an instrumentation kit could be successfully designed, developed and installed on an accelerated time basis. (Author)

AD-608 678 Div. 12, 25
OTS Prices: HC $2.00/MF $0.50

Missile Div., Chrysler Corp., Detroit, Mich.
EFFECT OF DYNAMIC IMBALANCE ON THE MOTION OF A SPINNING VEHICLE IN FREE FLIGHT,
by J. S. Holmstrom. 30 Apr 62, 48p SAE-TN-12-62
Contract AF04 694 25
BSD TDR62 80

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Reentry vehicles, Motion) (*Moment of inertia, Momentum), (*Free flight trajectories, Reentry vehicles), Spin, Euler's angles, Partial differential equations, Perturbation theory, Dynamics.

The principal moments of inertia and the location of the principal axes of a slightly asymmetrical body are determined. The Euler equations for a freely rotating body are solved approximately, assuming that the body is almost symmetric. (Author)

AD-608 714 Div. 12, 2
OTS Prices: HC $5.00/MF $1.00

Illinois Univ., Urbana. Engineering Experiment Station.
A STUDY OF SPECIAL INTERPLANETARY FLIGHT PROBLEMS.
Final rept. (Rept. no. 2),
by M. Z. v.Krzywoblocki. Jun 59, 152p
ILU-2835-R-2
Contract DA11 022ORD2835

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Interplanetary trajectories, Mathematical analysis), (*Astronautics, Interplanetary trajectories), (*Mars probes, Interplanetary trajectories), Rocket trajectories, Optimization, Celestial mechanics, Perturbation theory, N-body problem, Electromagnetic properties, Space environmental conditions, Calculus of variations, Magnetohydrodynamics, Space probes, Space flight.

The report contains discussions and presentations of various items pertinent to the subject of orbit mechanics and interplanetary trajectories in the solar system. These items are discussed in detail with the final results presented in a mathematical form. This collection of various technical details of a mathematical nature was performed with a special goal in mind. It was desired to select the items which were best suited to adequately describe interplanetary trajectories between the Earth and Mars. (Author)

AD-608 715 Div. 12
OTS Prices: HC $5.00/MF $1.00

Illinois Univ., Urbana. Engineering Experiment Station.
A STUDY OF SPECIAL INTERPLANETARY FLIGHT PROBLEMS.
Final rept. (Rept. no. 3),
by M. Z. V. Krzywoblocki. Apr 60, 163p
ILU-2835-R-3
Contract DA11 022ORD2835

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy. See also AD-608 714.

Descriptors: (*Interplanetary trajectories, Mars probes), (*Astronautics, Mars probes), (*Mars probes, Interplanetary trajectories), Boundary value problems, Transfer orbits, Orbital trajectories, Velocity, Acceleration, Calculus of variations, Fuel consumption, Thrust, Mathematical analysis, Space flight.

The report contains the following items: mathematical formulation of the boundary conditions referring to the trip to Mars, extension of the boundary conditions to a more general case, calculation of the terminal orbital velocities and acceleration, derivation of the equations of motion, and the variational approach. (Author)

AD-608 716 Div. 12
OTS Prices: HC $4.00/MF $1.00

Illinois Univ., Urbana. Engineering Experiment Station.
A STUDY OF SPECIAL INTERPLANETARY FLIGHT PROBLEMS.
Rept. no. 5,
by M. Z. V. Krzywoblocki. Jun 60, 127p
Contract DA11 022ORD2835
Unclassified report

See also AD-608 715.

Descriptors: (*Interplanetary trajectories, Astronautics), (*Astronautics, Interplanetary trajectories), (*Space probes, Interplanetary trajectories), Space navigation Space flight, Maneuverability, Thrust vector control systems, Reviews.

The volume consists of three chapters. Chapter I contains reviews of some papers and reports referring directly to the problem of navigation during interplanetary flight. Chapter II contains reviews of some papers pertinent to the general problem of interplanetary flight, and from this standpoint may be considered as a supplement to Volume I of the present series. Chapter III deals with the possible methods of correctional maneuver in space by using either high impulsive thrust or low continuous thrust.

AD-608 787 Div. 12, 30
OTS Prices: HC $3.00/MF $0.75

Plasmadyne Corp., Santa Ana, Calif.
ARC JET TUNNEL DEVELOPMENT AND CALIBRATION FOR PARABOLIC RE-ENTRY SIMULATION.
Final summary rept.,
by Daphne Christensen and Rolf D. Buhler.
3 Jun 61, 100p Plasma-1FR011-1872
Contract DA04 495 5060RD1872
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Atmosphere entry, Simulation), (*Wind tunnels, Thermodynamics), Aerodynamic heating, Descent trajectories, Reentry vehicles, Simulators, Test facilities, Heating elements, High-temperature research, Gas flow, Measurement.

A project for the development of an arc tunnel capable of attaining the enthalpy and pressure conditions outside a vehicle re-entering from a parabolic lunar trajectory is discussed. Some of the pertinent investigations listed are: 1. A study of the requirements for 'parabolic flight speed' simulation and how these requirements could be met in an arc-tunnel. 2. The demonstration of the required enthalpy (25,000 Btu/lb) in an air plasma jet and the expansion of this high enthalpy gas through a contoured supersonic nozzle. 3. The investigation of various gas kinetic and gas dynamic flow calibration techniques, carrying out as many of these measurements (including surveys) in the flow as permitted by the scope of this project. 4. The gathering of as much data as possible to increase the basic understanding of arc phenomena and arc gas heaters.

AD-608 802 Div. 12, 26
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
AN EVALUATION OF PROPOSED APPLICATIONS OF REMOTE HANDLING IN SPACE.
Technical rept. for 1954-1964,
by Gerald P. Chubb. Oct 64, 15p
Projs. 7184, 8171, Tasks 718407, 817105
AMRL TR64 98
Unclassified report

Presented at Symposium on Remotely Operated Special Equipment, sponsored by U. S. Atomic Energy Commission, 26-27 May 64.

Descriptors: (*Remote control systems, Spacecraft), (*Spacecraft, Remote control systems), (*Space environmental conditions, Remote control systems), Reviews, Space maintenance, Space capsules, Rendezvous spacecraft, Space tools, Handling, Human engineering.

This report reviews the literature from 1954 to 1964 and discusses problems of applying remote handling techniques to assembly and maintenance operations in space. The techniques can be classified in two categories: (1) encapsulation, where the operator is positioned in a vehicle having manipulanda which he can operate directly and (2) telechirics, where the operator is positioned at a control module physically distant from the manipulative device which he must operate remotely. Both telechiric and encapsulation approaches appear feasible. Considerable research and development is needed to make either concept practical. In that the situations in which these devices will be employed are associated with systems still in the design stages, consideration might first be given to better definitions of specific mission and task requirements. Advances in other areas of investigation should be monitored fairly closely. Work being done in rendezvous techniques and myoelectric control are relevant to problems to be overcome in applying remote handling devices to assembly and maintenance tasks in space.

AD-608 807 Div. 12, 28
OTS Prices: HC $1.00/MF $0.50

Aeromedical Research Lab. (6571th), Holloman AFB, N. Mex.
BEHAVIORAL RESEARCH WITH ANIMALS IN A MANNED SPACE LABORATORY,
by Herbert H. Reynolds and Frederick H. Rohles.
Nov 64, 10p
6571-ARL TR64 17
Unclassified report

Descriptors: (*Behavior, Weightlessness), (*Weightlessness, Environmental tests), (*Space environmental conditions, Behavior), Simulation, Laboratory animals, Motor reactions, Reaction (Psychology).

This paper suggests animal behavioral research during prolonged weightlessness. The research suggested is justified on the basis of the short gestation period and rapid maturation of small animals, the number of subjects which may be studied, the controls which can be achieved, and the resultant increase in reliability of findings. (Author)

AD-608 848 Div. 12, 9
OTS Prices: HC $1.00/MF $0.50

Air Force Flight Dynamics Lab., Research and

Technology Div., Wright-Patterson AFB, Ohio.
CLOSED-LOOP STABILITY OF A WINGED-PAYLOAD BOOSTER SUBJECT TO VARIATIONS OF AN ELASTIC MODE SHAPE.
Interim progress rept. for Sep-Nov 62,
by Robert L. Swaim. Nov 62, 22p ASRMCM-TM-62-11
Proj. 8219, Task 821901

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Booster motors, Winged body configurations), (*Launch vehicles (Aerospace), Stability), Payload, Elasticity, Wings, Flight, Dynamics, Control, Equations, Feedback, Design.

The analysis is concerned with the effect of the variations in first bending mode shape on the stability of a booster with a simple rate and attitude feedback control system. It is found that the system stability is still sensitive to small mode shape variations when elastic and short-period frequencies are close, but not to as great an extent as was the forward-loop system alone. The elastic mode and closed-loop short-period frequencies are relatively insensitive to the mode shape variations. However, the damping of the two modes is quite sensitive. (Author)

AD-608 884 Div. 12
OTS Prices: HC $2.00/MF $0.50

Naval Ordnance Test Station, China Lake, Calif.
624A SOLID-PROPELLANT MOTOR IMPACT TEST,
by Robert F. Vorwerk and Frederick H. Weals.
Oct 64, 34p
Proj. 886
NOTS TPR381; NOTS TP3674

Unclassified report

Descriptors: (*Guided missile safety, Falling bodies), (*Rocket motors (Solid propellant), Impact shock), Hazards, Simulation, Instrumentation, Telemeter systems, Photographs, Photographic analysis, Experimental data, Telemetering data, Guided missiles (Surface-to-surface), Air Force.

This report documents a test conducted on the Supersonic Naval Ordnance Research Track (SNORT), at the request of the Space Systems Division of the Air Force Systems Command, to obtain information relating to the hazard potential of the 624A solid-propellant motor. (Two multisegment 624A motors are to be used as the zero stage of the Titan III C vehicle.) The test item, a preprototype, heavy case, static firing version of the 624A motor equipped with a single center segment, was impacted at a velocity of 667 fps into a concrete, steel, and earth target placed 100 ft from the muzzle end of the track. The test approximated a fall-back condition from an altitude in excess of 10,000 ft with impact on a hard surface. Test setup, procedures, results, and conclusions are described. (Author)

AD-608 903 Div. 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
INVESTIGATION OF A LINEAR MODEL OF THE GENERAL ELECTRIC GAS SERVO SYSTEM,
by F. C. Rieman and W. Tsusaki. 14 Apr 60, 21p
STL/TM-60-0000-00035

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Guided missiles, Thrust vector control systems), (*Thrust vector control systems, Guided missiles), Servo amplifiers, Synchros, Servomechanisms, Heat transfer, Gases, Mathematical models, Analog computers, Simulation.

Results are given of an initial analog computer study of a linear mathematical model of the hot gas servo system; the study is part of a program leading to application of such servo systems to missile thrust vector control. The system consists basically of a pressure-controlled force servo with position feedback. Both velocity feedback and compensation on the position error are used for stability and response shaping. The essential components of the system are a torque motor, gas servo valve and actuator assembly, position and velocity transducers, and a servo amplifier and associated shaping networks. The system furnishes a linear position output which is proportional to an electrical input signal. For a given input signal, a given pressure differential is set up in the actuator resulting in a given force. The position loop senses actuator position, compares it with the input signal, and modifies the pressure to achieve the desired position.

13. Installations and Construction

AD-608 518 Div. 13
OTS Prices: HC $4.00/MF $0.75

New Mexico Univ., Albuquerque.
FEASIBILITY STUDY OF SHOCK ISOLATING A VERY LARGE STRUCTURE,
by J. P. Den Hartog, David E. Newland, and John F. Flory. Sep 64, 107p
Contract AF29 601 6002, Proj. 8811
WL TDR64 20

Unclassified report

Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge, Mass.

Descriptors: (*Vibration isolators, Underground structures), (*Underground structures, Vibration isolators), (*Suspension devices, Underground structures), Vibration, Structures, Helical springs, Pneumatic devices, Hydraulic systems, Shock (Mechanics), Equations, Graphics, Feasibility studies.

This report considers the problem of suspending a very large structure within an underground cavity so as to provide adequate shock isolation. The geometry necessary to uncouple the modes of vibration of a simple system is studied, and recommendations are made concerning the relation between base and side springs. Coil-spring suspension systems are investigated and general design equations and charts are presented. Pneumatic suspension is considered. A new type of pneumatic suspension consisting of corrugated metal bellows is proposed and design equations and charts for such a system are presented. Liquid suspension is briefly discussed. Transient waves in various shock isolation systems are studied. The report concludes that pneumatic suspension systems employing corrugated metal bellows hold much promise and should be further investigated. Shock isolation of a very large structure appears to be feasible using either coil-spring or pneumatic-bellows supports. (Author)

AD-608 531 Div. 13, 20
OTS Prices: HC $5.00/MF $1.00

Barry Controls, Inc., Watertown, Mass.
SIMULATION OF THE RESPONSE OF EQUIPMENT LOCATED IN UNDERGROUND INSTALLATIONS TO BLAST INDUCED GROUND MOTIONS.
Final engineering rept. for 1 Oct 61-31 May 64,
by Jerome E. Ruzicka and Peter C. Calcaterra. 30 Nov 64, 180p Barry-102
Contract DA49 146XZ108
DASA 1549

Unclassified report

Descriptors: (*Underground structures , Explosion effects), (*Shock (Mechanics), Underground structures), Vulnerability, Simulation, Nuclear explosions, Shock waves, Loading (Mechanics), Structures, Machines, Suspension devices, Vibration isolators, Vibration, Frequency, Simulators, Pneumatic devices, Feasibility studies, Civil engineering.

The characteristics of the response of isolated equipment installed in underground structures to the ground motions induced by nuclear blast are defined in terms of weapon yield, distance from blast, ground conditions and natural frequency of equipment suspension. A design approach is proposed for a variable stiffness, multi-degree-of-freedom device capable of generating the isolated equipment response motions. Pneumatic double-acting cylinders and elastomer springs are selected as the variable stiffness mechanism. Pneumatic rams are selected as the displacement mechanism. The performance characteristics of a model built using the proposed design approach are defined by means of acceleration-time traces of the motions generated for different values of oscillating frequency, load and initial displacement. Conclusions and recommendations are made based on comparison of the motions generated by the model to the expected response motion of isolated equipment in underground installations. (Author)

AD-608 539 Div. 13, 25
OTS Prices: HC $1.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
SOME APPLICATIONS OF PHOTOELASTIC MEASUREMENTS,
by A. Kammerer. 16 Oct 64, 26p
RSIC 316; TT 65 60136

Unclassified report

Trans. of Societe des Ingenieurs Civils de France. Memoires, 1945, v. 98, no. 1/3, p. 65-77.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Civil engineering, Optics), (*Photoelasticity, Optical analysis), Mechanical properties, Structural properties, Compressive properties, Structures, Elasticity, France.

The applications of photoelastic measurements in two-dimensional problems, three-dimensional problems, and vibration phenomena studies are reported.

AD-608 541 Div. 13, 2
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command. Wright-Patterson AFB, Ohio.
EXPERIMENTAL INVESTIGATION OF SOIL PRESSURE ON SUBTERRANEAN INSTALLATIONS SUBJECT TO EXTERNAL STATIC AND DYNAMIC FORCES,
by A. Melikhyani. 16 Nov 64, 13p
FTD TT63 711; TT 65 60137

Unclassified report

Edited trans. of Akademiya Nauk Gruzinskoi SSR, Tiflis. Soobshcheniya, 1962, v. 28, no. 5, p. 553-560.

Descriptors: (*Underground structures, Soil mechanics), (*Soil mechanics, Underground structures), Seismic waves, Earthquakes, Pressure, Statics, Dynamics, USSR.

The shape of the soil static pressure curve conforms with the theoretical curve obtained for circular subterranean structures. There is complete correspondence between cratering (due to explosion) and the pressure exerted on the retaining elements of the structure (as produced experimentally). On using the experimental data to calculate the static pressure of the soil on the underground structural model, it was found that the lateral force amounted to 60-70% of the vertical pressure. The magnitude of the soil dynamic pressure, which, on severe acceleration, makes up the major part of the static pressure, indicates the absolute necessity of studying soils with poor consistencies in regard to the pressure that will be exerted on underground installations in localities subject to seismic tremors. In the design of underground structures located in such areas, it becomes necessary to regard the seismic force as a function of static pressure. (Author)

AD-608 606 Div. 13
OTS Prices: HC $2.00/MF $0.50

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
RANDOM VIBRATION OF A BEAM COLUMN.
Technical rept. no. 10,
by M. Shinozuka. Oct 64, 34p
Contract Nonr266 91, Proj. NR064 470
Unclassified report

Descriptors: (*Cantilever beams, Vibration), (*Vibration, Cantilever beams), (*Earthquake-resistant structures, Beams (Structural), Frequency, Loading (Mechanics), Buckling (Mechanics), Towers, Mechanical properties, Compressive properties, Mathematical analysis, Integral equations, Differential equations, Boundary value problems, Statistical processes, Stochastic processes, Structural parts.

In this paper, the response of a uniform vertical cantilever beam to a horizontal random motion of the fixed end and a vertical load at the free end is discussed, and the space average of the mean square displacement is computed as a measure of the response. This problem, which does not appear to have been solved for random motion, may be considered a simplified model of many actual structures, e.g. the tower of suspension bridges under horizontal earthquake acceleration. (Author)

AD-608 607 Div. 13, 1, 25
OTS Prices: HC $3.00/MF $0.75

Institute for the Study of Fatigue and Reliability, Columbia Univ., New York.
THE ANALYSIS OF STRUCTURAL SAFETY.
Technical rept. no. 12,
by A. M. Freudenthal, J. M. Garrelts, and M. Shinozuka. Oct 64, 68p
Contract Nonr266 91, Proj. NR064 470
Unclassified report

Descriptors: (*Structures, Safety), (*Safety, Structures), Failure (Mechanics), Probability, Stresses, Mathematical analysis, Reliability, Analysis, Loading (Mechanics), Wings, Towers, Gust loads, Statistical functions, Wind.

This report is concerned with the probability of failure of structures designed with materials for which arbitrary frequency distributions of strength may be assumed. Topics include: safety and probability of failure; safety factors; multiple member structures; reliability functions.

AD-608 646 Div. 13, 18
OTS Prices: HC $2.00/MF $0.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
STUDY OF RELATIONSHIP OF NORMAL MAINTENANCE COST AND SIZE OF FACILITIES, FY62,
by J. A. South. 1963 46p
Proj. Y F015 15 06 504
NCEL N556
Unclassified report

Descriptors: (*Naval shore establishments, Maintenance), (*Maintenance, Naval shore establishments), Costs, Statistical analysis, Mathematical models, Least squares method, Management engineering, Control systems, Installation, Buildings, Computers, Equations.

Maintenance cost as a function of facility size is studied statistically using data pertinent to three selected types of Naval Shore facilities. It is shown that useful normal mathematical models are possible. However, the data available for analysis do not contain sufficient pertinent information. (Author)

AD-608 683 Div. 13
OTS Prices: HC $1.00/MF $0.50

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PERFORMANCE OF SUBSURFACE DRAINS AT SELECTED AIRFIELDS DURING THE 1960 FROST MELTING PERIOD,
by William C. Sayman and George D. Gilman. Oct 64, 24p
CRREL SR69
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Landing fields, Drainage), (*Drainage, Landing fields), Water, Disposal, Pipes, Airports, Military facilities, Soils, Freezing, Melting, Civil engineering, Sanitary engineering.

During the 1960 frost melting period, the performance of subsurface drainage systems was investigated at selected airfields in the northern continental United States by periodic observations at manholes and/or risers. Records of air temperature, subsurface temperature, and precipitation were also maintained. The observations were one-time 'spot' notations, intended to determine the feasibility of performing more comprehensive studies and no quantitative measurements were undertaken; nor do the data obtained permit evaluation as to the overall effectiveness of the inspected systems or the validity of the criteria used in their design. However, the study showed that the observed subdrain systems were generally performing their function of removing subsurface water. The study also confirms the need for periodic inspection and maintenance of all subsurface systems. (Author)

AD-608 874 Div. 13
OTS Prices: HC $4.00/MF $0.75

Stanford Research Inst., Menlo Park, Calif.
MULTIDIMENSIONAL ANALYSIS OF STRESS AND STRAIN IN SOILS.
Final rept. for 15 Jun 63-30 Jun 64,
by Robert V. Whitman. Jun 64, 115p
Contract DA49 146XZ219, Proj. PHU4637
DASA 1558
Unclassified report

Descriptors: (*Soil mechanics, Boundary value problems), (*Engineering geology, Soil mechanics), (*Statics, Soil mechanics), Compressive properties, Stresses, Strain (Mechanics), Elasticity, Plasticity, Creep, Loading (Mechanics), Foundations (Structures), Mathematical analysis, Civil engineering, Programming (Computers).

Recent extensive studies of the static mechanical behavior of elasto-plastic soils have been reviewed to see how well they can predict the behavior of soils in engineering applications. Problems of particular practical interest are boundary value problems of contained plastic flow such as the motion of soil under a footing. Several theories, such as the elastic-perfectly plastic model, give useful results while retaining realistic simplicity in the model. Although they cannot describe all of the behavior of soils, these theories can be put to immediate use in certain engineering problems. A computer program, based on the relaxation method of Harper and Ang, has been developed to analyze contained plastic flow beneath a footing for static loading conditions. (Author)

14. Materials (Non-Metallic)

AD-608 510 Div. 14
OTS Prices: HC $4.00/MF $1.00

TRW Electromechanical Div., Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
OXIDATION RESISTANT HIGH TEMPERATURE PROTECTIVE COATINGS FOR TUNGSTEN.
Rept. for 15 May 63-15 May 64,
by H. J. Nolting and R. A. Jefferys. Jul 64, 112p
Contract AF33 657 11151, Proj. 7312, Task 731201
ML TDR64 227

Unclassified report

Descriptors: (*Tungsten, Refractory coatings), (*Refractory coatings, Tungsten), (*Silicon coatings, Tungsten), Sheets, Low-pressure research, Coatings, Silicon alloys, Tungsten alloys, Titanium alloys, Zirconium alloys, Hafnium, Sprays, Oxidation, Anti-oxidants, Erosion, Tensile properties, Stresses, Castings, Boron compounds, Nitrides, High-temperature research, Heat-resistant materials.

A controlled process has been established for application of (silicon-tungsten) and titanium + zirconium + (silicon-tungsten) coatings to tungsten sheet. Protective capabilities of these coatings on arc cast and powder product tungsten sheet have been determined at one atmosphere (air) from 1600 to 3600F under cyclic conditions. Exposure at static pressures below 15 mm Hg (air) at 3400-3500F resulted in varying degrees of deterioration of the (silicon-tungsten) and titanium + zirconium + (silicon-tungsten) coatings. Under dynamic low pressure conditions (2000-2800 ft/sec simulated air flow) at 16-20 mm Hg both coatings were protective to tungsten and resisted erosion in the temperature range of 2900-3400F (180 to 325 BTU/sq ft/sec heat flux range). Various refractory compound mixtures plasma sprayed on tungsten sheet were not protective at elevated temperatures in air. A silicon-tungsten + titanium nitride-boron nitride coating combination protected tungsten for short periods of time at 3700F. Tensile properties were determined for silicon-tungsten and titanium + zirconium + (silicon-tungsten) coated arc cast tungsten sheet at various temperatures to 3300F. In stress oxidation tests the same systems loaded at 20 percent of the yield strength showed essentially no creep after 1 hour at 3350F in air. The coatings were completely protective at this stress level. (Author)

AD-608 560 Div. 14, 25
OTS Prices: HC $1.00/MF $0.50

Michigan Univ., Ann Arbor. Coll. of Engineering.
MgO-MgFe2O4 MICROSTRUCTURES.
Technical rept.
by Howard McCollister and Lawrence H. Van Vlack.
Nov 64, 12p ORA-05612-1T
Contract Nonr1224 47, Proj. 05612

Unclassified report

Descriptors: (*Refractory materials, Microstructures), (*Magnesium compounds, Oxides), (*Solid solutions, Magnesium compounds), Phase studies, Grain boundaries, Ferrites, Iron compounds, Solubility, Mixtures.

Magnesioferrite-periclase microstructures can be correlated to their thermal history. Grain boundary precipitation occurs at higher temperatures, whereas a Widmanstatten precipitation is favored at lower temperatures. Magnesiowustite which is cooled slowly through the solubility limit will first produce magnesioferrite at the grain boundary, followed by a Widmanstatten precipitate of magnesioferrite within the grains. Prolonged heat treatments at any temperature favor the spheroidization of the magnesioferrite within the periclase matrix. (Author)

AD-608 564 Div. 14, 4
OTS Prices: HC $1.00/MF $0.50

Houghton (E. F.) and Co., Philadelphia, Pa.
DEVELOPMENT OF FIRE RESISTANT WATER BASED HYDRAULIC FLUIDS.
Bimonthly rept. no. 4,
by Philip Rakoff, G. John Colucci, and Robert K. Smith. 27 Nov 64, 26p
Contract NObs90269

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hydraulic fluids, Additives), (*Corrosion inhibition, Hydraulic fluids), Glycols, Amines, Borates, Flammability, Ignition, Inhibition, Compatibility, Antioxidants.

The study of ignition inhibitors for water glycol fluids has continued with emphasis on non crystalline compounds (See also AD-607 948). A search for better screening methods of corrosion inhibitor system in the target fluids was started. One candidate fluid was examined with respect to the target specification. (Author)

AD-608 630 Div. 14, 31
OTS Prices: HC $1.00/MF $0.50

American Oil Co., Whiting, Ind.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUID.
Bimonthly progress rept. no. 3, 1 Aug-1 Oct 64,
by K. R. Bunting, A. M. Dobry, E. A. Swakon, P. C. Vienna, and L. W. Mixon. 1 Oct 64, 8p
Contract NObs90267, Proj. SR001 03 01, Task 606

Unclassified report

See also AD-608 631.

Descriptors: (*Hydraulic fluids, Flammability), (*Flammability, Hydraulic fluids), Synthesis (Chemistry), Compatibility, Polyethylene plastics, Phosphorylation, Chlorination, Lubricants, Pumps, Shipborne, Corrosion inhibition, Iron, Copper, Silver, Aluminum, Zinc, Rubber, Handling, Storage, Toxicity, Viscosity, Solubility, Sea water.

The object of the study is the development of a water-base hydraulic fluid which (1) yields a fire-resistant non-aqueous residue, (2) is compatible with materials of construction and sea-water contamination, (3) satisfactorily lubricates shipboard pumps, (4) presents no unusual storage or handling problems, and (5) exhibits no toxicological hazards under conditions of use. Low-density polyethylene can be chlorophosphonated by reaction with phosphorus trichloride and oxygen. Hydrolysis and neutralization produces products which show considerable promise as thickeners. The product from 21,000-molecular-weight polyethylene, neutralized to a pH of 8.0 with sodium hydroxide, produces a fluid which (1) has the desired viscosity, (2) is shear stable in tests using a Raytheon Sonic Oscillator, (3) can be rendered non-corrosive to iron, copper, silver braise, aluminum, and zinc by the addition of corrosive inhibitors, (4) has no deleterious effect on Buna N rubber, (5) is compatible with 10% synthetic sea water, (6) is non-toxic and non-irritating, and (7) appears to produce a non-aqueous residue having satisfactory flammability characteristics. (Author)

AD-608 631 Div. 14, 31
OTS Prices: HC $1.00/MF $0.50

American Oil Co., Whiting, Ind.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUID.
Bimonthly progress rept. no. 2, 1 Jun-1 Aug 64,
by K. R. Bunting, A. M. Dobry, E. A. Swakon, P. C. Vienna, and L. W. Mixon. 1 Aug 64, 9p
Contract NObs90267, Proj. SR001 03 01, Task 606
Unclassified report

See also AD-600 901.

Descriptors: (*Hydraulic fluids, Flammability), (*Flammability, Hydraulic fluids), Synthesis (Chemistry), Solubility, Polyethylene plastics, Phosphorylation, Chlorination, Amines, Viscosity, Organic phosphorus compounds, Storage, Handling, Hazards, Toxicity, Sea water, Compatibility, Lubricants, Pumps, Shipborne, Hydrolysis.

The object of the study is the development of a water-base hydraulic fluid which (1) yields a fire-resistent non-aqueous residue, (2) is compatible with materials of construction and sea-water contamination, (3) satisfactorily lubricates shipboard pumps, (4) presents no unusual storage or handling problems, and (5) exhibits no toxicological hazards under conditions of use. Attempts to prepare polymers of unsaturated organic acids of phosphorus having molecular weights sufficiently high to thicken water were not successful. Low-density polyethylene can be chlorophosphorated by reaction with phosphorus trichloride and oxygen. Hydrolysis and neutralization results in products which contain about 15% phosphorus and based on preliminary data, show considerable promise as thickeners. (Author)

AD-608 641 Div. 14, 25
OTS Prices: HC $2.00/MF $0.50

Brown Univ., Providence, R. I. Div. of Applied Mathematics.
MECHANICS OF RATE-INDEPENDENT MATERIALS.
Technical rept. no. 95,
by A. C. Pipkin and R. S. Rivlin. Nov 64, 32p
Contract Nonr562 10, Proj. NRO64 406
Unclassified report

Descriptors: (*Elasticity, Mathematical analysis), (*Plasticity, Mathematical analysis), Materials, Deformation, Stresses, Strain (Mechanics), Differential equations, Integral equations, Functional analysis, Tensor analysis, Mechanics.

Constitutive equations for finite deformations of rate-independent materials with memory are discussed. The Piola stress is taken to be a functional of the path of deformation in strain space, independent of the rate of traversal of this path. The restrictions on the form of this functional arising from initial isotropy are exhibited. Differential and integral approximations to the functional are considered. A general theory of elastic-plastic materials, i. e. rate-independent materials with an elastic range. is formulated. (Author)

AD-608 647 Div. 14, 4, 31
OTS Prices: HC $1.00/MF $0.50

Monsanto Research Corp., Dayton, Ohio.
DEVELOPMENT OF FIRE-RESISTANT WATER BASE HYDRAULIC FLUID.
Bimonthly rept. no. 4, 1 Oct-30 Nov 64,
by E. S. Blake, G. F. Deebel, and G. A. Richardson. 30 Nov 64, 10p
Contract NObs90270 Unclassified report

See also AD-606 340.

Descriptors: (*Hydraulic fluids, Flammability), Synthesis (Chemistry), Phosphates, Organic phosphorus compounds, Paint, Compatibility, Shipborne, Solubility, Ignition, Explosions, Hazards.

The broad objective is the development of a usable, fire-resistant, water-base hydraulic fluid for shipboard use, in which the nonaqueous phase is fire-resistant. The contract effort is restricted to water solutions as contrasted with emulsions and/or suspensions. Fire resistance in the nonaqueous phase is important in hydraulic systems operating at 5000 psi, where the aqueous phase in certain segments of the system may, under special circumstances, evaporate, thereby leaving a hazardous explosive residue, and where spray leaks develop there may be flammable residues exposed to ignition sources.

AD-608 653 Div. 14, 12
OTS Prices: HC $1.00/MF $0.50

Aerospace Corp., Los Angeles, Calif.
THERMAL EXPANSION OF BeO-SiC COMPOSITES,
by W. J. Gardner. 15 Oct 64, 19p TDR-469(5250-10)-1
Contract AF04 695 469
SSD TDR64 187
Unclassified report

Descriptors: (*Refractory materials, Composite materials), (*Thermal expansion, Ceramic materials), (*Composite materials, Thermal expansion), Thermal stresses, Thermal properties, Thermal conductivity, Phase studies, Mechanical properties, Beryllium compounds, Oxides, Silicon compounds, Carbides, Microstructure, Corrosion inhibition, Manufacturing methods, Equations.

An investigation was made of the coefficient of thermal expansion to 1000C for composite BeO-SiC bodies. Values were found to be in general agreement with those calculated from the equation proposed by Turner relating resultant expansion to the single component coefficients, weight fraction of the phases, phase density, and bulk modulus. (Author)

AD-608 679 Div. 14
OTS Prices: HC $1.00/MF $0.50

Watervliet Arsenal, N. Y.
ALPHA CLASSIFICATION OF MICROFIBERS. PART V,
by M. A. Sadowsky and M. A. Hussain. Aug 64, 21p
Proj. 1A0 24401A110 06
WVT 6417
Unclassified report

See also AD-429 527.

Descriptors: (*Composite materials, Fibers), (*Fibers, Composite materials), Mathematical analysis, Mathematical models, Equations, Stresses, Shear stresses, Tensile properties, Compressive properties, Deflection, Moments, Matrix algebra, Elasticity.

The delta-ring has been put through the acceptance test with alpha = 4, and a rigid fiber has been formed in the result. (Author)

AD-608 736 Div. 14
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison, Wis.

LINEAR MOVEMENT OF PLYWOOD AND FLAKEBOARDS AS RELATED TO THE LONGITUDINAL MOVEMENT OF WOOD.
Research note,
by B. G. Heebink, E. W. Kuenzi, and A. C. Maki.
Oct 64, 36p
FPL 073

Unclassified report

Descriptors: (*Plywood, Elasticity), (*Wood, Laminates), Organic materials, Manufacturing methods, Physical properties, Mechanical properties, Humidity, Deformation, Correlation techniques, Experimental data, Tables.

Physical and elastic properties of veneer specimens of aspen, yellow birch, Douglas-fir, and redwood were determined, and the influence of these properties on the movement of plywood and flakeboards fabricated of matching material was evaluated. The longitudinal-to-grain movement of the veneer was closely related to the linear movement of the plywood and flakeboards. (Author)

AD-608 741 Div. 14
OTS Prices: HC $1.00/MF $0.50

Forest Products Lab., Madison, Wis.
THE EFFECT OF CONFINING PRESSURE ON THE COMPRESSION PARALLEL-TO-THE-GRAIN STRENGTH OF SMALL CLEAR WOOD SPECIMENS.
Research note,
by Thomas Lee Wilkinson. Nov 64, 14p
FPL 057

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Wood, Loading (Mechanics), Pressure, Compressive properties, Elasticity, Fibers, Stresses, Failure (Mechanics), Experimental data, Foundations (Structures).

Since wood foundation piles are normally used under conditions of confining lateral pressure from the soil in which they are imbedded, it has been suggested this pressure may have an effect upon the compression parallel-to-the-grain strength of the piles. Accordingly, a study was conducted to evaluate the effect of this pressure on the compression-parallel strength of small clear specimens of Douglas-fir and red oak. To simulate earth pressures, oil pressures of 50 and 100 pounds per square inch were used. No effect was found on the strength of the two species at either pressure. (Author)

AD-608 764 Div. 14
OTS Prices: HC $5.00/MF $1.00

Union Carbide Corp., Lawrenceburg, Tenn.
PYROLYTIC COATING OF CARBON FILAMENTS.
Final rept. for 15 May 63-15 May 64,
by K. J. Zeitsch and P. H. Higgs. Nov 64, 160p
Contract AF33 657 11297, Proj. 7350, Task 735002
ML TDR64 297

Unclassified report

Descriptors: (*Coatings, Pyrolytic graphite), (*Carbon, Refractory coatings), (*Pyrolytic graphite, Refractory coatings), (*Graphite, Textiles), Filaments, Fibers, Tensile properties, Weight, Weaving, Tapes, Load distribution.

A continuous process has been developed to coat the individual filaments of graphite yarn with pyrolytic graphite. The pyrolytic coating increased the strength-to-weight ratio of the filaments by a factor of 1.3 and acted as a sizing on the yarn to make weaving easier. Tapes woven from the coated yarn showed a load distribution factor as high as 0.9. (Author)

AD-608 803 Div. 14, 4, 25
OTS Prices: HC $1.00/MF $0.50

Frick Chemical Lab., Princeton Univ., N. J.
EFFECT OF SULFUR RANK ON THE CHEMORHEOLOGY OF CROSSLINKED POLYSULFIDE ELASTOMERS,
by W. J. MacKnight, N. Canter, and A. V. Tobolsky.
1964, 19p RLT-84
Contract Nonr185807

Unclassified report

Descriptors: (*Elastomers, Stresses), (*Sulfides, Polymers), (*Inorganic polymers, Sulfides), Sulfur, Chemical bonds, Additives, Carbon black.

The chemical stress relaxation of a series of 10 mole per cent crosslinked poly(ethylene polysulfides) of varying sulfur ranks was investigated. In addition, the effect of carbon black on the chemical relaxation time of lightly crosslinked disulfide polymers is discussed. It is concluded that stress decay in the elastomers studied can be well represented by a simple exponential decay law although a sum of two exponentials 'fits' the data somewhat better. It is also concluded that the major portion of stress decay in crosslinked polysulfides occurs by the reversible scission and bond interchange of polysulfide linkages of rank greater than two. (Author)

AD-608 873 Div. 14, 31
OTS Prices: HC $1.00/MF $0.50

United States Rubber Co., Wayne, N. J.
PROTECTIVE COATINGS FOR DEEP SUBMERGENCE VESSELS.
Quarterly rept. no. 3, 19 Aug-18 Dec 64,
by D. C. MacDonald and A. S. Glowacki.
4 Dec 64, 16p
Contract NObs90246, Proj. SR007 03 04, Task 1008

Unclassified report

See also AD-604 573.

Descriptors: (*Moisture proofing, Laminates), (*Underwater equipment, Protective treatments), (*Laminates, Mechanical properties), Moisture, Permeability, Plastics, Glass textiles, Filaments, Penetration, Water, Coatings, Reinforcing materials, Diffusion, Loading (Mechanics), Epoxy plastics, Hydrostatic pressure, Plastic coatings, Rubber coatings.

A limited reversible loss of physical properties with increasing moisture content has been demonstrated in the EPON 828/1031 resin. Permeability measurements have been made on resin and laminate. Serious damage to laminates with the application of high pressure water to exposed filaments has been demonstrated. (Author)

15. Mathematics

AD-608 558 Div. 15
OTS Prices: HC $1.00/MF $0.50

Oceanics, Inc., Plainview, N. Y.
THE NUMERICAL SOLUTION OF EIGENVALUE PROBLEMS,
by Theodore R. Goodman. Nov 64, 18p
Oceanics-TN-64-06
Contract Nonr4432 00, Proj. NR062 341 1 10 64
Unclassified report

Descriptors: (*Boundary value problems, Numerical analysis), (*Numerical analysis, Boundary value problems), Differential equations, Integration, Functions, Perturbation theory, Complex numbers, Programming (Computers), Numbers.

A method is presented for solving eigenvalue problems based on a procedure by Goodman and Lance for solving two-point boundary value problems.

AD-608 576 Div. 15
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
ON THE CONCEPT OF FIFOV IN QUEUES AND A DETAILED STUDY OF THE CASE OF A POISSON QUEUE WITH TWO HETEROGENEOUS SERVERS.
Scientific rept.,
by B. Krishnamoorthi. 16 Sep 64, 33p
SP-1729/001/00
Unclassified report

Supported in part by the Indian Statistical Institute, Calcutta.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Queueing theory, Stochastic processes), (*Operations research, Queueing theory), Probability, Statistical processes, Statistical functions, Power series, Series, Integral transforms, Bessel functions.

In several queuing situations the order in which the units depart is not the same as the order in which they arrive at the system. This phenomenon is called 'The Violation of the 'First-In, First-Out' Principle,' (FIFOV). A quantitative study of FIFOV is of operational importance in tandem queuing and many other situations. In this paper, a general discussion is given of the concept and study a special aspect of FIFOV in a Poisson queue (Poisson input and exponential service times) with two heterogeneous servers working in parallel. In this connection the time-dependent distribution of the output in and M/M/1 queue has been explicitly obtained. Defining X as the number of customers superseding a customer taking service from the slower channel one obtains the distribution and the first two moments of X under a queue discipline which is a modification of the classical one. An optimality criterion is suggested and a numerical illustration is given.

AD-608 651 Div. 15
OTS Prices: HC $3.00/MF $0.75

Pacific Union Coll., Angwin, Calif.
SOME TOPICS IN DIFFERENTIAL ALGEBRA.
Technical rept.,
by Oma Hamara. 1964, 59p
Grant Nonr G00039 64, Proj. NRO43 310
Unclassified report

Prepared in cooperation with Arizona Univ., Tucson.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Algebra, Differential equations), (*Differential equations, Algebra), Rings, Theory, Sequences, Mapping (Transformations), Groups (Mathematics).

Contents: Preliminary differential ring theory, Rings of fractions and differential modules, Inverse and direct limits, Extensions of isomorphisms, The Wronskian and related topics.

AD-608 690 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A SIMPLE PROBABILISTIC PROOF OF THE DISCRETE GENERALIZED RENEWAL THEOREM,
by Sidney C. Port. Dec 64, 13p RM-4330-PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Probability, Theorems), Stochastic processes, Sequences, Distribution theory.

In this memorandum a new and simpler proof of the discrete generalized renewal theorem is presented. (Author)

AD-608 723 Div. 15, 12, 30
OTS Prices: HC $2.00/MF $0.50

Army Missile Test Center, White Sands Missile Range, N. Mex.
A TECHNIQUE FOR THE DETERMINATION OF TRANSFER FUNCTION COEFFICIENTS.
Real-Time Data rept. no. 11,
by Norbert B. Binkle. Sep 60, 28p LRR-13
Unclassified report

Descriptors: (*Input-output devices, Signal-to-noise ratio), (*Functions, Integral transforms), (*Integral transforms, Functions), Real time, Programming (Computers), Digital computers, Numerical analysis, Sampling, Polynomials, Least squares method.

Contents:
Introduction
Z-transform of second order system
Inverse z-transform and determination of the output samples
Recovering of the transfer function from samples
Results from sinusoidal input
Results from trapezoidal input conclusions

AD-608 724 Div. 15, 12, 30
OTS Prices: HC $2.00/MF $0.50

Ordnance Mission, White Sands Missile Range, N. Mex.
RESEARCH IN TRANSFER FUNCTION COEFFICIENT ANALYSIS.
Real Time Data rept. no. 17,
by Norbert Binkle. Jun 61, 30p LRR-37
Unclassified report

Descriptors: (*Input-out devices, Signal-to-noise ratio), (*Functions, Least squares method), (*Least squares method, Functions), Real time, Programming (Computers), Digital computers, Integral transforms, Numerical analysis, Sampling, Filters (Electromagnetic wave), Flight simulators.

A Transfer Function Coefficient Analyzer is a digital computer, that is preprogrammed so that it can accept discrete data from input and output of a transfer function and compute the coefficients thereof. The basic program consists of a 'Least Squares Method,' that reduces an over determined set of simultaneous equations, developed by Z-transform, to the normal equations and a program that solves the normal equations for the coefficients of the transfer functions. In real cases, noise will be superimposed on the data, and will reduce the accuracy. Suitable filtering or smoothing of input and output data is necessary prior to application of the 'Least Squares Method.' Programs for filter equations are built-in, the coefficients of which are subject of consideration in this report. (Author)

AD-608 726 Div. 15, 30
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif.
ADAPTIVE STATISTICAL PROCEDURES IN RELIABILITY AND MAINTENANCE PROBLEMS.
Technical rept. no. 99,
by J. L. Gastwirth and J. H. Venter. 12 Oct 64, 32p
Contract Nonr22552, Proj. NR342 022
Unclassified report

Descriptors: (*Statistical processes, Reliability), (*Reliability, Statistical processes), (*Maintenance, Statistical processes), Stochastic processes, Life expectancy, Optimization, Sequences, Probability, Test methods, Operations research.

In this paper the case is considered in which the system has an exponential lifetime. Several adaptive or sequential inspections plans are proposed. These plans are based either on maximum likehood methods or on refinements of the Robbins-Monro stochastic approximation method.

AD-608 752 Div. 15
OTS Prices: HC $4.00/MF $1.00

Liege Univ. (Belgium).
DIFFERENTIAL EQUATIONS WITH FIXED CRITICAL POINTS,
by F. J. Bureau. 1964, 136p
Contract AF61 052 612
AFOSR 64 2271
Unclassified report

Pub. in Annali di Matematica pura ed applicata, 1964, v. 64, no. 4, p. 229-364.

Descriptors: (*Differential equations, Theory), Integration, Algebra, Functions, Transformations (Mathematics), Stability, Transcendental functions, Complex numbers, Complex variables, Belgium.

The object of this paper was to determine all the differential equations of the form y = R(y, y, x), differentiated with respect to t, where R is a rational function of y and y, with analytic coefficients in x, whose general integral has no parametric critical points.

AD-608 851 Div. 15
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
ON THE DEGREE OF APPROXIMATION OF CONTINUOUS FUNCTIONS BY POSITIVE LINEAR OPERATORS,
by J. Karamata and M. Vuilleumier. Oct 64, 14p
MRC-TSR-521
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Real variables, Functional analysis), (*Functional analysis, Real variables), (*Operators (Mathematics), Numerical analysis), Polynomials, Functions.

A theorem of B. Bajsanski and R. Bojanic ('A note on approximation by Bernstein polynomials.' Bull. Amer. Math. Soc. 70(1964), p. 675-677) is extended to general linear positive operators. (Author)

AD-608 852 Div. 15, 25
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
AREA AND MOMENT OF INERTIA THEOREMS FOR CIRCULAR DOMAINS IN C(n),
by Josephine Mitchell. Nov 64, 23p
MRC-TSR-522
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Moment of inertia, Theorems), (*Complex variables, Geometric forms), Mapping (Transformations), Set theory, Groups (Mathematics), Functions, Invariance, Differential geometry, Transformation (Mathematics).

A generalization of results on area and moment of inertia due to P. J. Myrberg for the hypersphere in two complex variables is given for certain complete circular domains (including the Cartan domains) in the space of n complex variables. (Author)

AD-608 854 Div. 15
OTS Prices: HC $3.00/MF $0.75

Mathematics Research Center, Univ. of Wisconsin, Madison.
NUMERICAL CONTOUR INTEGRATION.
Doctoral thesis,
by Robert Ellis Barnhill. Oct 64, 86p MRC-TSR-519
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Complex variables, Functions), (*Integration, Complex variables), (*Numerical analysis, Integration), Integrals, Polynomials.

This paper is concerned with numerical integration along contours in the complex plane. Let R sub n denote the quadrature remainder with n evaluation points. An error functional related to R sub n is minimized, subject to the constraint that R sub n (f) be exact whenever f is a polynomial of certain degree. A special case is given, with computed examples of the theory's application. Another problem considered is that of the convergence of quadratures as the number of evaluation points increases. Theorems characterizing the domains of holomorphy that ensure convergence are given. (Author)

AD-608 855 Div. 15
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.

AN ASYMPTOTIC LOWER BOUND FOR THE ENTROPY OF DISCRETE POPULATIONS WITH APPLICATION TO THE ESTIMATION OF ENTROPY FOR UNIFORM POPULATIONS,
by E. B. Cobb and Bernard Harris. Oct 64, 14p
MRC-TSR-516
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Sampling, Population (Mathematics)), (*Population (Mathematics), Sampling), Statistical functions, Integrals, Statistical analysis.

An asymptotic lower bound for the entropy of a multinomial population with an unknown and perhaps countably infinite number of classes is obtained. This bound is a function of the first k + 1 occupancy numbers of a random sample, and is a useful estimator when most of the sample information is contained in the low order occupancy numbers. (Author)

AD-608 856 Div. 15
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
REGULARLY VARYING FUNCTIONS AND THE PRINCIPLE OF EQUICONTINUITY,
by B. Bajsanski and J. Karamata. Oct 64, 22p
MRC-TSR-517
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Real variables, Functions), (*Functions, Theorems), (*Groups (Mathematics), Topology), Mapping (Transformations), Algebraic topology, Measure theory, Integration, Sequences.

The concept of regularly varying functions is extended from real functions of a real variable to mappings of one topological group with a filter into another. The classical results on regularly varying functions are generalized, and one of these generalizations contains as a particular case the equicontinuity principle (or Banach-Steinhaus theorem). In the case of regularly varying functions of n real variables, the representation theorem is given. (Author)

AD-608 859 Div. 15
OTS Prices: HC $1.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
DIFFERENCE METHODS FOR A NON-LINEAR ELLIPTIC SYSTEM OF PARTIAL DIFFERENTIAL EQUATIONS,
by G. T. McAllister. Aug 64, 14p
MRC-TSR-504
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Difference equations, Iterative methods), (*Iterative methods, Difference equations), (*Partial differential equations, Boundary value problems), Equations, Functions, Sequences, Nonlinear differential equations.

This paper proves the existence and uniqueness of non-negative solutions to the Dirichlet problem associated with a nonlinear elliptic system. An iteration scheme is proposed for solving the associated difference equation.

AD-608 872 Div. 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica Calif.
ON CONFORMALLY RELATED METRIC SPACES ONE OF WHICH ADMITS AN IRROTATIONAL ISOMETRY,
by Dominic G. B. Edelen. 24 Nov 64, 19p P-3019

Unclassified report

Paper prepared for Tensor and derives in part from Appendix A of RM-4017-RC.

Descriptors: (*Set theory, Tensor analysis), (*Tensor analysis, Topology), Theorems, Transformations (Mathematics), Vector analysis, Functions, Algebraic topology, Equations, Theory.

AD-608 907 Div. 15
OTS Prices: HC $1.00/MF $0.50

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ON CONFIDENCE LIMITS IN THE ANALYSIS OF EXPERIMENTAL DATA.
Technical memo.,
by Herbert Wolf. 6 Sep 59, 10p RAD-9-TM-59-35
Contract AF04 647 305, Proj. WS107A2

Unclassified report

A portion of the original document contains fine detail which may make reading of photocopy difficult.

Descriptors: (*Statistical analysis, Experimental data), (*Probability, Theory), (*Statistical functions, Reliability), Ablation, Numerical analysis.

This study outlines the theory of fiducial probability as a bais for testing the reliability of regression coefficients. In a numerical example the method is applied to a recent ablation experiment conducted by the Physics Department. (Author)

16. Medical Sciences

AD-608 570 Div. 16
OTS Prices: HC $2.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
THE EFFECT OF CHANGING THE RESULTANT LINEAR ACCELERATION RELATIVE TO THE SUBJECT ON NYSTAGMUS GENERATED BY ANGULAR ACCELERATION.
Rept. no. 99,
by Martin P. Lansberg, Fred E. Guedry, Jr., and Ashton Graybiel. 1 Sep 64, 44p
Proj. MR005 13 6001, NASA Order No. R93, Task 1 .
Unclassified report

See also AD-608 571.

Descriptors: (*Acceleration tolerance, Semicircular canals), (*Semicircular canals, Acceleration tolerance), Deceleration, Rotation, Stimulation, Eye, Recording systems, Space medicine.

The effect of centripetal acceleration on nystagmus was studied by placing men at radii of 17 and 20 feet in various orientations relative to the center of rotation. Angular accelerations and decelerations were approximately 10 deg/sec squared. In some of these different positions, the planes of the semicircular canals remained unchanged relative to the plane of rotation, but the orientation of the resultant force relative to the otolith system was changed. In several such situations the magnitude, plane, and direction of nystagmus were changed by centripetal accelerations between 1 and 2 g-units. Results are discussed in terms of otolith modulation of sensory input from the semicircular canals. (Author)

AD-608 571 Div. 16
OTS Prices: HC $1.00/MF $0.50

Naval School of Aviation Medicine, Pensacola, Fla.
INFLUENCE OF LABYRINTH ORIENTATION RELATIVE TO GRAVITY ON RESPONSES ELICITED BY STIMULATION OF THE HORIZONTAL SEMICIRCULAR CANALS.
Rept. no. 100,
by Manning J. Correia and Fred E. Guedry, Jr. 2 Sep 64, 10p
Proj. MR005 13 6001, NASA Order R93 Task 1
Unclassified report

See also: AD-608 570.

Descriptors: (*Acceleration tolerance, Semicircular canals), (*Semicircular canals, Acceleration tolerance), Deceleration, Rotation, Stimulation, Eye, Space medicine.

Two experiments were conducted to examine the effects of different orientations of the horizontal semicircular canal cupulae relative to gravity on nystagmic output follow ing deceleration from rotation about the earth-horizontal axis. Differences in nystagmus output with different stopping positions were not entirely consistent with predictions based on the assumption that cupula deflection was influenced by gravity. A more plausible explanation, modulation of canal-initiated responses by otolith activity, was presented. A high incidence of motion sickness was encountered while rotating subjects about the erth-horizontal axis and it was apparently controlled by the mental task assigned to the subject. (Author)

AD-608 578 Div. 16
OTS Prices: HC $1.00/MF $0.50

Hawaii Univ., Honolulu.
BEHAVIOR OF 'GOONEY BIRDS' ON MIDWAY ISLANDS.
Final rept. for 1 Jan 62-31 Oct 64,
by Hubert Frings. 16 Nov 64, 3p
Grant Nonr G00033 62, Proj. NR301 661
Unclassified report

Descriptors: (*Birds, Midway), (*Sound signals, Birds), Sounds, Noises, Aircraft, Adaptation (Physiology), Behavior.

Four trips were made to Midway Islands during the early part of 1962: January 27-31; February 27 - March 3; April 12-17; and June 13-16. These were spaced so as to give opportunity to observe development of the young Albatrosses, particularly the sound signals. A fifth visit, to test the possibility of scaring flying birds with recorded sounds was made on December 8-15. Observations on the Albatrosses during the early part of the year revealed that the populations of the two species were about the same as in 1958. There was some reduction in Laysans generally in the housing area, but not serious. The first sounds produced by hatchlings of both species are juvenile-type, high-frequency Nest Calls, which are like those of the adults. Within a short time, the characteristic peeping used for food-solicitation develops, and for a few months these two calls represent the repertory of calls of the babies. Shortly after hatching, the babies exhibit defensive beak-snapping, and, as in the adults, the Black-foots also 'growl' while snapping. Within about a month, the babies throw up the head and attempt the Sky Call, but usually the motion is silent, and the true call does not appear until they are a few months old. When almost fully fledged, ready to leave the islands, the babies have the following calls: Nest Call, Food Peeping, partial Sky Call, and, in the Black-foots, defensive growling.

AD-608 603 Div. 16
OTS Prices: HC $8.00/MF $2.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ADVANCES IN BIOLOGICAL CHEMISTRY, 1962, VOL. 4.
4 Aug 64, 499p
FTD TT63 1083; TT 65 60267
Unclassified report

Unedited rough draft trans. of Uspekhi Biologicheskoi Khimii (USSR) 1962, v. 4, p. 3-261.

Descriptors: (*Biochemistry, Reviews), USSR, Cholinesterase, Enzymes, Toxicity, Toxins and Antitoxins, Amino acids, Peptides, Muscles, Nucleic acids, Nucleoproteins, Amides, Phosphorylation, Blood proteins, Glucose, Carbohydrates, Potatoes, Starches, Plants (Botany).

Contents: Chloroplast proteins, by N. M. Sisakyan and S. S. Melik-Sarkisyan; Active cholinesterase centers, by V. I. Rozengart; Enzymatic mechanism of some forms of intoxication (Attempt at an enzymatic classification of poisons), by A. A. Pokrovskiy: Comparative biochemical analysis of amino acids and dipeptides in muscle tissue, by P. L. Vul'fson; Current concepts concerning the molecular nature and structure of nucleic acids and nucleo-proteins, by A. S. Spirin; Methods of isolation and investigation of nucleotides, by L. N. Bobrova and B. N. Stepanenko; Biochemistry of polyamides, by V. Z. Gorkin; Intermediate reactions in the processes of oxidative phosphorylation, by A. V. Kotel'nikova; Sialic acids, by L. I. Linevich; On blood glucoproteins and aminopolysaccharides, by Ye. L. Rozenfel'd; Enzymatic transformations of starch and its decomposition products in potato tubers, by A. N. Petrova and T. T. Bolotina; Distribution, formation and utilization of phytin in higher plants, by A. M. Sobolev.

AD-608 614 Div. 16
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
THE PROBLEM OF CANCER IN LIGHT OF EMBRYOLOGICAL DATA,
by M. P. Shabad-Ivanova. 19 Nov 64, 10p
FTD TT63 1177; TT 65 60260

Unclassified report

Unedited rough draft trans. of Arkhiv Patologii (USSR) 1959, v. 21, no. 10, p. 72-74.

Descriptors: (*Cancer, Embryology), (*Embryology, Cancer), Pathology, Medical research, Tissues (Biology), Neoplasms, USSR.

AD-608 650 Div. 16
OTS Prices: HC $6.00/MF $1.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
LIFE AND SPACE,
by V. Borisov and O. Gorlov. 31 Aug 64, 286p
FTD MT63 200; TT 65 60309

Unclassified report

Edited machine trans. of mono. Zhizn' i Kosmos, Moscow, 1963, 200p.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Space medicine, Life support), (*Life support, Space medicine), Space biology, Closed ecological systems, Space environmental conditions, Astronauts, Physiology, Weightlessness, Acceleration tolerance, Body weight, Respiration, Decompression sickness, Cosmic rays, Food supplies, Water supplies, Safety, Training, Space flight.

Soviet biological experiments carried out with great thoroughness, embraced different sides of the problem of guaranteeing safety of a man's flight in space. In essence they provided a 'visa' for the first flight. This book relates, in popular form, the problems and achievements of space biology and medicine. Its authors are Soviet physician-physiologists. Therefore, it is natural that in the book much scientific information is given, from the physiological point of view, concerning questions of preparing future cosmonauts for flights.

AD-608 674 Div. 16
OTS Prices: HC $2.00/MF $0.50

Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.
GLYCOGEN: CHARACTERIZATION, BIOSYNTHESIS AND METABOLISM.
Final progress rept.,
by Ernest Bueding and Stanley A. Orrell, Jr. Nov 64, 31p
Contract Nonr3417 00

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Glycogen, Biosynthesis), (*Metabolism, Glycogen), Enzymes, Muscles, Tissues (Biology), Ascaris, Molecular weight, Proteins, Polysaccharides, Biochemistry, Water, Temperature, Pathology, Diseases.

In an attempt to obtain a product more closely approaching the state of glycogen in intact animal tissues, a procedure for the extraction of this polysaccharide is described. This procedure is designed to avoid physical and chemical alteration by strong alkali, acid, or high temperature and distortion of the molecular weight spectrum resulting from selective losses during sedimentation. Glycogen obtained by means of the cold water procedure is stable in the presence of various agents that are known to disrupt hydrogen bonds and to disperse aggregates. The cold water procedure has no effect on the molecular size and distribution of alkali-extracted glycogen added to the tissue homogenate prior to the extraction. These and other observations discussed in this paper indicate that the product obtained by the cold water procedure approaches more closely the state of glycogen in the living cell than the products of the various extraction methods used hitherto.

AD-608 746 Div. 16
OTS Prices: HC $2.00/MF $0.50

Zaret Foundation, Inc., Scarsdale, N. Y.
AN EXPERIMENTAL STUDY OF THE CATARACTOGENIC EFFECTS OF MICROWAVE RADIATION.
Final rept. for 8 May 63-7 May 64,
by Milton M. Zaret. Oct 64, 28p
Contract AF30 602 3087, Proj. 5545, Task 554502
RADC TDR64 273

Unclassified report

Research done with the cooperation of the New York Univ., N. Y. School of Medicine and the Polytechnic Inst. of Brooklyn, N. Y.

Descriptors: (*Microwaves, Hazards), (*Eye, Electromagnetic waves), (*Electromagnetic waves, Eye), (*Medical examination, Eye), Radiobiology, Microwaves, Spectrum analyzers, Photographic analysis, Medical equipment.

An exploratory investigation was performed to determine the applicability of spectrophotometric analysis to the measurement of cataractogenesis. It was found that standard spectrophotometric techniques cannot be utilized for this purpose but that a new method for performing spectrophotometry in the living eye, which is known as retinal reflection densitometry, shows promise of being capable of performing this task. A methodology is presented for an applied research investigation of cataractogenesis in order to delineate the parameters of personnel hazard associated with microwave environments. The biological and microwave experimental protocols as well as the relationship of laboratory induced cataractogenesis to the clinical study of human microwave cataracts are discussed. (Author)

AD-608 762 Div. 16
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
MECHANICAL STIFFNESS OF MAN'S LOWER LIMBS,
by Arthur E. Hirsch and Leonard A. White.
Oct 64, 21p
Proj. S F015 14 04
DTMB 1810

Unclassified report

Descriptors: (*Body, Mechanical properties), (*Compressive properties, Body), Legs, Feet, Shock (Mechanics), Loading (Mechanics), Measurement, Joints (Physiology), Muscles, Underwater explosions, Vibration, Body weight, Test equipment.

Measurements of the compressibility or mechanical stiffness of the lower limbs under static loads are reported. Deformations of the various portions of the limb structure are discussed and major load-bearing regions of the foot are identified. (Author)

AD-608 768 Div. 16
OTS Prices: HC $2.00/MF $0.50

Geoscience, Ltd., La Jolla, Calif.
THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES.
Quarterly rept. for 1 Jul-30 Sep 64,
by H. F. Poppendiek, N. D. Greene, P. M. Morehouse, R. Randall, and J. R. Murphy. 30 Sep 64, 27p GLR-29
Contract Nonr409500

Unclassified report

Descriptors: (*Erythrocytes, Damage), (*Body fluids, Thermal conductivity), (*Electrical conductance, Body fluids), Tissues (Biology), Blood, Blood plasma, Freezing, Stresses (Physiology), Cryogenics, Beef, Liver, Biophysics, Biology.

This report describes Geoscience's research on thermal and electrical conductivities of biological fluids and tissues for the Medicine and Dentistry Branch of the Office of Naval Research. Changes in the electrical conductivity of hemolyzed blood have been related to erythrocyte damage. The thermal conductivities of aqueous and vitreous humor were determined. The correlations between thermal conductivity and physical properties of biological tissues and fluids were studied. Preliminary investigations of the effect of freezing beef liver in liquid nitrogen on thermal conductivity have been conducted. The techniques of freezing blood in liquid nitrogen have been examined also. (Author)

AD-608 776 Div. 16
OTS Prices: HC $1.00/MF $0.50

Wisconsin Univ., Madison.
MECHANISM OF PROTEIN SYNTHESIS.
Final rept. for 1 Sep 63-31 Aug 64,
by Harlyn O. Halvorson. 31 Aug 64, 9p
Grant AF AFOSR387 63
AFOSR 64 2065

Unclassified report

Descriptors: (*Proteins, Biosynthesis), (*Saccharomyces, Metabolism), Yeasts, Enzymes, Transferases, Amino acids, Ribonucleic acids, Peptides, Ribosomes.

During the course of the past few years a cell-free system was developed from the hybrid yeast Saccharomycetes dobzyanskii x S. fragilis. With this system it was possible to examine a number of problems dealing with the mechanism of protein synthesis which are included in the final report. In addition, a companion program was initiated with S. lactis to (a) examine the similarities in cell-free incorporating systems from related organisms and (b) to facilitate the isolation of the transfer enzyme, a step towards a completely defined incorporating system. Cell-free incorporating systems are generally inefficient and have a short half-life. One of the major defects is usually attributed to nuclease action. To better understand, and control, nuclease action in cell extracts, a further characterization of these enzymes was undertaken. (Author)

AD-608 789 Div. 16
OTS Prices: HC $2.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
THE RELATION OF NUMBER OF SCAN LINES PER SYMBOL HEIGHT TO RECOGNITION OF TELEVISED ALPHANUMERICS.
Interim rept.,
by Merrill F. Elias, Alvin M. Snadowsky, and Edward F. Rizy. Oct 64, 27p
Proj. 5577, Task 557704
RADC TDR64 433

Unclassified report

Descriptors: (*Television display systems, Visibility), (*Visibility, Television display systems), Perception, Resolution, Performance (Engineering), Human engineering, Numbers, Visual acuity.

To determine the effect of symbol resolution on the recognition of alphanumeric symbols displayed on a television screen (video tube), 10 subjects were repeatedly exposed to 36 symbols under 9 conditions of symbol resolution. Results indicated that, depending upon its unique configuration, a symbol will require a greater or fewer number of scan lines than another to be correctly identified; and, for most symbols, a resolution as low as three or four scan lines is not adequate for acceptable accuracy of identification under controlled laboratory conditions. (Author)

AD-608 790 Div. 16
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
CARDIOPULMONARY MEASUREMENTS OBTAINED BY RIGHT AND LEFT CARDIAC CATHETERIZATION OF MACACA MULATTA.
Final rept.,
by Ralph O. Hayden. Oct 64, 13p
Proj. 7222
AMRL TDR64 69

Unclassified report

Descriptors: (*Monkeys, Cardiovascular system), (*Cardiovascular system, Monkeys), (*Respiration, Monkeys), Heart, Cannulation, Arteries, Veins, Respiratory system.

Eight normal Macaca mulatta anesthetized with pentobarbital were subjected to right and retrograde left heart catheterization and analysis of expired gas. Measurements were made of the aortic, left ventricular, pulmonary capillary, pulmonary arterial, right ventricular and right atrial pressures, heart rate, cardiac and stroke index, peripheral and pulmonary vascular resistance, tension-time index, systolic ejection period and rate index, left ventricular work and stroke index, minute respiratory volume and oxygen consumption index and arterial and mixed venous blood oxygen content and saturation. The data will serve as a baseline for cardiopulmonary studies with this species. (Author)

AD-608 793 Div. 16
OTS Prices: HC $1.00/MF $0.50

Brussels Univ. (Belgium).
GENETIC REPLICATION AND MACROMOLECULAR SYNTHESES IN TEMPERATE BACTERIOPHAGES.
Final rept.,
by R. Thomas. 1 Oct 64, 8p
Grant AF EOAR64 10
AFOSR 64 2231

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Bacteriophages, Biosynthesis), (*Genetics, Bacteriophages), Bacteria, Immunity, Reproduction (Physiology), Mutation, Streptomycins, Ribosomes, Desoxyribonucleic acids, Escherichia coli, Polymers, Belgium.

Experiments involving mixed superinfection of lysogenic bacteria with an homologous phage and an immunity-insensitive mutant show that the repressor of immunity blocks altogether transcription and replication directly. A new method allows (a) preferential isolation of those conditional defective mutations which affect early functions and (b) isolation of sus mutants which are well corrected by bacterial suppressors. There is direct evidence for Spotts and Stanier's hypothesis that the bacterial gene controlling the response to streptomycin is involved in the determination of the structure of ribosomes. Many streptomycin-resistant mutants (which are now known to be altered in the structure of their ribosomes) behave much as pleiotropic suppressors. The exact structure of ribosomes probably contributes to the specificity of the translation process.

AD-608 840 Div. 16
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE ECOLOGICAL COMPLEX IN EXTRATERRESTRIAL BASES,
by S. H. Dole. Nov 64, 9p P-3009
Unclassified report

Prepared for presentation at third annual meeting of the Working Group on Extraterrestrial Resources on November 18-20, 1964.

Descriptors: (*Extraterrestrial bases, Ecology), (*Ecology, Extraterrestrial bases), Space biology, Life support, Closed ecological systems, Algae, Weight, Reliability, Water, Recovery.

Several desirable requirements for life-support systems in extra-terrestrial bases are discussed: high reliability, minimum weight transported from Earth, ease of installation and maintenance, effective conversion of metabolic waste products, and maximum use of indigenous supplies and materials.

AD-608 841 Div. 16, 10
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PYRIDOXINE (VITAMIN B6) TOXICITY LITERATURE REVIEW.
Technical rept.,
by Robert A. Schneider. Oct 64, 18p
Proj. 6302, Task 630202
AMRL TR64 106
Unclassified report

Descriptors: (*Vitamin B complex, Toxicity), (*Dimethyl hydrazine (1-1), Poisoning), Toxic tolerance, Propellants, Therapy, Animals, Humans, Reviews.

The literature from 1940 through June 1963 was surveyed to summarize the data from pyridoxine toxicity studies in animals and to ascertain the highest doses of pyridoxine (vitamine B6 analogs) that have been administered to human subjects as a therapeutic measure with no clinical evidence of toxicity. Analysis of the data indicated that doses of 25 mg/kg pyridoxine hydrochloride should be well tolerated as a therapeutic measure when required. In particular, pyridoxine hydrochloride can be used when required in the specific treatment of a clinical entity such as acute UDMH intoxication. (Author)

AD-608 862 Div. 16
OTS Prices: HC $2.00/MF $0.50

Army Biological Labs., Frederick, Md.
BIOLOGICAL SAFETY CABINETS,
by Gardner G. Gremillion. Jul 59, 42p ABL-SD-29
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Containers, Microorganisms), (*Medical equipment, Infectious diseases), Biological laboratories, Containers, Safety, History, Design, Production.

In one form or another, the Biological Safety Cabinet is gaining general acceptance as an essential item of equipment in the infectious disease laboratory. The report describes the various types of cabinets which have been developed and used at Fort Detrick, and some details concerning their uses, construction, and commercial suppliers. (Author)

AD-608 877 Div. 16
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
AN EVALUATION OF THE HUMAN RETINAL BURN PROBLEM ARISING FROM ATOMIC DETONATIONS,
by W. R. Elswick and H. H. Mitchell.
15 Dec 59, 49p RM-2500
Contract AF49638700
Unclassified report

Descriptors: (*Radiation injuries, Retina), (*Retina, Radiation injuries), (*Burns, Retina), Nuclear explosions, Vision, Radiation effects, Eye, Images, Anatomy, Physiology, Pathology, Radiological dosage, Adaptation (Physiology), Thresholds (Physiology), Equations.

The general problem of retinal burns resulting from nuclear detonations within the atmosphere was investigated. The work in the field was reviewed and employed in this study in order to allow quantitative assessment of the danger of eye burn in any particular situation. Burns will occur when the radiant intensity reaches a value of around 0.6 to 2.0 cal/sq cm on the retina. Maximum distances for threshold burn based on 2 cal/sq cm from low altitude bursts can extend for as much as 25 miles (daytime) to 75 miles (nighttime) depending upon the visibility and the yield of the weapon. The problem is minimized for most situations because the fireball will not be in the field of vision for most people. For those for whom it is in the field of vision, the size of the image and its location on the retina, are important in determining actual damage to sight. (Author)

AD-608 889 Div. 16
OTS Prices: HC $3.00/MF $0.75

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
HEARING SENSATIONS IN AMPLITUDE MODULATED RADIO FREQUENCY FIELDS.
Master's thesis,
by William Tarver Harvey and James Page Hamilton.
Aug 64, 56p

AFIT GE/EE/64 11 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Physiology, Hearing), (*Auditory perception, Radio fields), (*Bone, Sound transmission), Amplitude modulation, Probes (Electromagnetic), Sound, Thresholds (Physiology), Vibration, Stimulation, Touch, Head, Audiofrequency, Pressure, Ear, Equations.

When the head is subjected to an amplitude modulated radio frequency field, a hearing sensation results. This sensation was investigated by holding a small circular metal probe close to the skull. The probe was then excited at a radio frequency of 3.5 megacycles. The audio frequency components of the field existing between the probe and the head produced the threshold electromechanical pressures necessary for hearing. These electromechanical pressures were computed and compared to the pressures on the skull which were necessary to produce bone conduction hearing. These pressure values fall within the same limits, and produce a similar characteristic threshold curve. This leaves little doubt that the investigated hearing phenomenon is caused by the bone conduction mechanism. (Author)

17. Metallurgy

AD-608 527 Div. 17
OTS Prices: HC $1.00/MF $0.50

Metals Processing Lab., Mass. Inst. of Tech., Cambridge.
DEFORMATION PROCESSING OF ANISOTROPIC METALS.
Progress rept. no. 7, 1 Jul-31 Aug 64,
by D. H. Avery and W. A. Backofen. Oct 64, 9p
Contract NOw65 0124d

Unclassified report

Descriptors: (*Titanium alloys, Deformation), (*Deformation, Metals), Aluminum alloys, Tin alloys, Plasticity, Tensile properties, Transition temperature, Strain (Mechanics), Alloys.

This work involves more systematic experiments on superplasticity in the 5 Al-2.5 Sn titanium alloy. Tensile tests have been made from room temperature to 1065C, which is slightly above the reported alpha-beta transition temperature. Tensile yield strength and elongation for an initial strain rate of 0.025/minute are shown as a function of temperature. A measure of strain-rate sensitivity of the flow stress is given. The temperature dependence of m is given for two different ranges of pulling speed. The data indicate that m increases with temperature in 2 stages, a sharp rise at about 600C to values of 0.3 - 0.4 followed by another increase to about 0.5 on approaching alpha-beta transformation.

AD-608 591 Div. 17
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
FRACTURE CHARACTERISTICS OF STRUCTURAL METALS.
Quarterly progress rept. no. 3, 23 Jul-22 Oct 64,
by M. F. Amateau and E. A. Steigerwald.
20 Nov 64, 28p TRW-ER-5937-2
Contract NOW .64 0186C

Unclassified report

Descriptors: (*Steel, Toughness), (*Fracture (Mechanics), Steel), Metals, Thickness, Test methods, Tensile properties, Heat treatment, Deformation, Brittleness, Stresses, Mathematical analysis.

The correspondence between plain strain fracture toughness values obtained from various test methods was evaluated for AISI 4340 steel over a range of material thickness and strength levels. Attempts were made to qualitatively determine the degree of correlation between the various tests and the conditions which may contribute to uncertainty in the evaluation parameter. (Author)

AD-608 600 Div. 17, 26
OTS Prices: HC $6.00/MF $1.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
NONFERROUS METALLURGY, 1963, VOL. 6, NO. 5.
7 Aug 64, 218p
FTD MT64 16; TT 65 60264

Unclassified report

Edited machine trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Tsvetnaya Metallurgiya (USSR) 1963, v. 6, no. 5, p. 1-159.

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Metallurgy, Scientific research), Geology, Ores (Metal sources), Mining engineering, Minerals, Flotation, Separation, Molybdenum, Tungsten, Metals, Magnetic properties, Lead, Platinum, Oxides, Aluminum, Titanium, Electrochemistry, Vanadium, Carbides, Alkali metals, Niobium, Tantalum, Silver, Gallium, Refining (Metallurgy), Metallography, Material forming, Economics, Production.

AD-608 671 Div. 17, 8, 14
OTS Prices: HC $3.00/MF $0.75

IIT Research Inst., Chicago, Ill.
STRESS-DEPENDENT INTERACTIONS BETWEEN CESIUM AND OTHER MATERIALS.
Final rept. for 1 Nov 63-31 Oct 64,
by D. W. Levinson. 18 Nov 64, 75p IITRI-B215-22
Contract Nonr3441 00

Unclassified report

Descriptors: (*Cesium, Corrosive liquids), (*Liquid metals, Cesium), (*Brittleness, Cesium), Materials, Refractory metals, Nickel alloys, Nickel, Stainless steel, Steel, Titanium alloys, Titanium, Zirconium alloys, Copper alloys, Aluminum alloys, Ceramic materials, Surface active substances, Microstructure, High-temperature research, Deformation, Stresses, Tensile properties, Fracture (Mechanics), Ductility, Vapors, Silver solders, Thermionic converters, Mercury, Mechanical properties, Corrosive gases, Compatibility.

A summary of the effects of the presence of cesium liquid or vapor upon the mechanical behavior of materials germane to thermionic diode construction is presented. These studies include static and dynamic bend behavior, tensile behavior at several strain rates, fatigue behavior, and stress stability. The effects studied and reported herein are reversible in the sense that if the cesium is removed the effect disappears. This type of interaction is known as liquid (or vapor) metal embrittlement. None of the metallic materials was catastrophically embrittled. Reductions in ductility were observed, and, in one case (18-8 stainless steel) a reduction in yield stress was evident. Both tungsten and Kovar showed improved ductility in the presence of cesium. The alumina ceramic materials examined were found to be influenced by cesium unless a glassy grain boundary phase was present. Unfortunately these latter materials are known to suffer a diffusion-dependent deterioration in cesium. The reduction in strength of the higher (all crystalline) alumina is, small. The yttria ceramics examined were seriously weakened by molten cesium and must therefore be evaluated with care for these applications. (Author)

AD-608 701 Div. 17
OTS Prices: HC $2.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
CURRENT METHODS OF FRACTURE-TOUGHNESS TESTING OF HIGH-STRENGTH ALLOYS WITH EMPHASIS ON PLANE STRAIN,
by James E. Campbell. 31 Aug 64, 28p DMIC-207
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Alloys, Fracture (Mechanics)), (*Fracture (Mechanics), Test methods), Toughness, Measurement, Strain (Mechanics), Temperature, Stresses, Sheets, Metal plates, Rods, Forging, Structures, Loading (Mechanics).

Fracture-toughness testing using principles of fracture mechanics has developed to the point where it can be used as a basis for selection of materials, for estimating limiting design stresses assuming the presence of small flaws, and for analyzing failures. Current methods of measuring plane-stress and plane-strain fracture-toughness parameters are presented in this report. The specimens include center-cracked, edge-cracked, single-edge-cracked, surface-cracked, and notched round bars, which are subjected to tensile loading, and notched bars for bend tests. The different types of specimens permit evaluating sheet, plate, bar stock, and forgings as well as material from failed structures. Application of fracture-toughness parameters to design of high-strength structures is reviewed for both static and fatigue loading. Consideration of the fracture-mechanics concepts in design should lead to fewer problems with brittle fracture in high-strength structures. (Author)

AD-608 737 Div. 17, 25
OTS Prices: HC $2.00/MF $0.50

Hammond Metallurgical Lab., Yale Univ., New Haven, Conn.
X-RAY DIFFRACTION STUDY OF IMPERFECTIONS IN RHENIUM.
Technical rept. no. 10,
by C. N. J. Wagner and E. N. Aqua. Jul 64, 28p
Contract Nonr609 43

Unclassified report

Descriptors: (*Rhenium, X-ray diffraction analysis), (*Crystal lattice defects, Rhenium), Powder metals, Microstructure, Crystal structure, Deformation, Sheets, Stresses, Mathematical analysis, Particle size, Strain (Mechanics).

An analysis was made of the broadening of the powder pattern peaks from rhenium powders exhibiting different strength properties in the green compacts and from deformed rhenium sintered sheet. The primary source of the line broadening was the small particle size of the crystallites; broadening attributed to lattice distortions was small or negligible. Evidence was found for growth faults on the (002) planes in the samples studied, and most significantly in the powder of the low green strength briquet (one fault every 100 (002) planes) and in the deformed sheet rhenium. (Author)

AD-608 738 Div. 17, 25
OTS Prices: HC $4.00/MF $1.00

Hammond Metallurgical Lab., Yale Univ., New Haven, Conn.
AN X-RAY DIFFRACTION STUDY ON THE EFFECT OF RHENIUM ON THE OCCURRENCE OF FAULTING IN REFRACTORY ALLOYS.
Technical rept. no. 11,
by E. N. Aqua and C. N. J. Wagner. Sep 64, 137p
Contract Nonr609 43

Unclassified report

Paper is based on thesis by E. N. Aqua submitted to Yale Univ. New Haven, Conn. in partial fulfillment of the requirements for the degree of Doctor of Engineering.

Descriptors: (*Refractory metal alloys, Crystal lattice defects), (*Rhenium, Refractory metal alloys), Solid solutions, Rhenium alloys, Niobium alloys, Tantalum alloys, Tungsten alloys, Metallography, Fractography, Fourier analysis, Analysis of variance, Integral equations, Particle size, Crystal structure, Metal powders, Transition temperature, Hardness, Strain (Mechanics), Deformation, Fracture (Mechanics).

The bcc alloys of the terminal solid solutions of rhenium in niobium, tantalum and tungsten were investigated by several x-ray and metallographic techniques. The anisotropic particle size broadening for the cold worked Ta-10a/o Re, W-20a/o Re and Nb-Re alloys (containing less than 11a/o Re) is interpreted as evidence for stacking and/or twin faults on the (112) planes in the bcc structures. The addition of rhenium increased the fault density in the tungsten alloy, but not in the tantalum and niobium alloys. The addition of greater than 11a/o Re to niobium raises the ductile-brittle transition temperature to room temperature. These alloys fractured (when hammered) by cleavage on the (001) planes. The isomorphous Ta-10a/o Re alloy is also brittle, exhibiting (001) cleavage. Fractographic examination of the cleavage facets revealed the characteristic cleavage step and river patterns, indicating plastic deformation occurring prior to fracture. Microcracks and deformation twins associated with the crack formation were observed on sections transverse to the cleavage surface.

AD-608 742 Div. 17, 25
OTS Prices: HC $1.00/MF $0.50

Rutgers Univ., New Brunswick, N. J. Coll. of Engineering.
FINE STRUCTURE OF METALS.
Final rept.,
by S. Weissmann. 1 Dec 64, 4p
Contract Nonr404 09

Unclassified report

Descriptors: (*Metals, Crystal lattice defects), (*Crystal lattice defects, Metals), Single crystals, Recrystallization, Copper alloys, Gold alloys, Strain (Mechanics), Stresses, X-ray diffraction analysis, Electron microscopy, Magnetic fields, Heat treatment, Aluminum alloys, Crystal structure.

A combination method was developed for the study of the defect structure of solids. This method consists of a quantitative analysis of the stress-strain configuration in single crystals based on the strain data supplied by the x-ray divergent beam method followed by a visual inspection of the defect structure by transmission electron microscopy. In the most recent extension of the stress-strain analysis the stored elastic energy as well as the maximum shearing strains in any desired crystallographic set of planes are also obtained. Aided by a digital computer, this combination method was applied to a number of problems in physical metallurgy and solid state physics and the results obtained are described. (Author)

AD-608 813 Div. 17
OTS Prices: HC $8.25/MF $2.50

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH INVESTIGATION TO DETERMINE MECHANICAL PROPERTIES OF NICKEL AND COBALT-BASE ALLOYS FOR INCLUSION IN MILITARY HANDBOOK-5, VOLUME I.
Rept. for Apr 61-Jun 64,
by A. Greene, H. Sieber, D. Wells, and T. Wolfe.
Oct 64, 525p
Contract AF33 657 8924, Proj. 7381, Task 738103
ML TDR64 116

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nickel alloys, Mechanical properties), (*Cobalt alloys, Mechanical properties), Chromium alloys, Tungsten alloys, Iron alloys, Molybdenum

alloys, Titanium alloys, Aluminum alloys, Tensile properties, Compressive properties, Deformation, Stresses, Rupture, Fatigue (Mechanics), Experimental data, Test methods, Temperature, Creep, Tests, Handbooks.

Design information is given on four nickel and cobalt base alloys for inclusion in Military Handbook-5. The alloys investigated were Rene' 41, L-605, Inconel 702, and Incoloy 901. The mechanical properties investigated were tensile, compression, shear, bearing, creep, stress-rupture, and fatigue. The general results obtained are presented in Section VII of this report and the data generated for Military Handbook-5 are presented in Section VIII. (Author)

AD-608 842 Div. 17
OTS Prices: HC $3.00/MF $0.50

Aluminum Co. of America, New Kensington, Pa.
INVESTIGATION OF THE MECHANISM OF STRESS CORROSION OF ALUMINUM ALLOYS.
Quarterly rept. no. 3,
by G. C. English and J. McHardy. 30 Nov 64, 48p
Contract NOw64 0170c

Unclassified report

See also AD-602 120.

Descriptors: (*Aluminum alloys, Corrosion), (*Cathodic protection, Aluminum alloys), (*Corrosion, Stresses), Voltage, Polarization, Failure (Mechanics), Microstructure, Metallography, Corrosive liquids.

This report summarizes work on the development of a suitable experimental technique for the precise measurement of the potentials required for cathodic protection, as a means of establishing the potential of phases in an alloy; and to measurement of these potentials in 7075 alloy in tempers susceptible and non-susceptible to stress corrosion.

AD-608 846 Div. 17
OTS Prices: HC $10.00/MF $3.25

Republic Aviation Corp., Farmingdale, N. Y.
RESEARCH INVESTIGATION TO DETERMINE MECHANICAL PROPERTIES OF NICKEL AND COBALT-BASE ALLOYS FOR INCLUSION IN MILITARY HANDBOOK-5, VOLUME II.
Rept. for Apr 61-Jun 64,
by A. Greene, H. Sieber, D. Wells, and T. Wolfe.
Oct 64, 698p
Contract AF33 657 8924, Proj. 7381, Tas 738103
ML TDR64 116

Unclassified report

See also AD-608 813.

Descriptors: (*Nickel alloys, Mechanical properties), (*Cobalt alloys, Mechanical properties), Chromium alloys, Nickel alloys, Tungsten alloys, Aluminium alloys, Titanium alloys, Iron alloys, Molybdenum alloys, Tensile properties, Compressive properties, Shear stresses, Deformation, Creep, Rupture, Stresses, Fatigue (Mechanics), Loading (Mechanics), Handbooks.

Design information on four nickel and cobalt base alloys for inclusion in Military Handbook-5 is presented. The alloys investigated were Rene 41, L-605, Inconel 702, and Incoloy 901. The mechanical properties investigated were tensile, compression, shear, bearing, creep, stress-rupture and fatigue. The raw data generated is presented in this volume.

AD-608 863 Div. 17
OTS Prices: HC $2.00/MF $0.50

Air Force Aero Propulsion Lab., Air Force Systems Command, Wright-Patterson AFB, Ohio.
STUDY OF THE FEASIBILITY OF A TECHNIQUE FOR DETERMINING THE IMPURITY CONTENT OF LIQUID ALKALI METALS.
Rept. for Mar 63-May 64,
by Richard H. Herald. Sep 64, 29p
Proj. 8169, Task 816902
APL TDR64 101

Unclassified report

Descriptors: (*Alkali metals, Impurities), (*Liquid metals, Freezing point depressants), Test methods, Determination, Oxygen, Potassium, Rubidium, Cesium, Freezing, Measurement.

An investigation is made of a technique which shows promise of being capable of identifying and measuring oxygen impurities in alkali metal systems at concentrations as low as 10 parts per million. Specifically, the influences of oxygen impurities on the freezing points of potassium, rubidium, and cesium have been studied theoretically and related to existing experimental data. This report presents a theoretically developed correlation that relates freezing-point depression to oxygen content in these metals and the supporting experimental data. An apparatus, which incorporates features for accurately measuring oxygen impurities in cesium, rubidium, and potassium by a freezing-point technique, is described along with the essential operating procedures.

AD-608 868 Div. 17, 14
OTS Prices: HC $3.00/MF $0.75

Aeon Labs., Egham (England).
METALLOGRAPHY OF S.A.P. ALLOYS AND ITS RELATION TO CREEP RESISTANCE.
Technical documentary rept. for 15 Oct 62-14 Oct 63,
by I. S. Brammer and D. W. Dawe. Oct 64, 69p
Contract AF61 052 463, Proj. 7351, Task 735101
ML TDR64 211

Unclassified report

This rept. forms Part II of a two part investigation. Part I was published as ASD-TDR-63-343, Part I, Jun 63 (AD-411 200).

Descriptors: (*Aluminum alloys, Metallography), (*Cermets, Metallography), (*Creep, Metallography), Electron microscopy, Aluminum compounds, Oxides, Foils, Microstructure, Heat treatment, Deformation, Stresses, Rupture, Recrystallization, Grain structure (Metallurgy), Phase studies, Melting, Dispersion hardening.

The structures of several different S.A.P. alloys (sintered aluminium-alumina powder metallurgy alloys) have been investigated by means of transmission electron metallography. The dispersed aluminium oxide has been shown to be alpha-Al_2O_3. The aluminium matrix of all the samples examined will not undergo grain growth until the metal has been deformed greater than 98% reduction in thickness. It is suggested that the orientation of the oxide plates may effect the grain growth. Specimens have been examined after creep tests and stress rupture tests but no significant structural changes can be observed. It is suggested that the creep strength is due to the complete stability of the dispersed oxide phase up to the melting point of the matrix and also to the small stable grain size of the matrix. Heat treatments carried out above the melting point of the matrix have shown that a massive honeycomb network of oxide is produced which may explain the creep results of others workers obtained above the melting point of the aluminium. (Author)

AD-608 895 Div. 17, 14, 26
OTS Prices: HC $2.00/MF $0.50

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
Comp. by Mary F. Banks. Nov 64, 48p
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Abstracting, Metallurgy), (*Materials, Bibliographies), (*Bibliographies, Materials), (*Metallurgy, Bibliographies), Alloys, Metals, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Aluminum, Carbon, Graphite, Refractory materials, Ceramic materials, Oxides, Refractory metals, Refractory metal alloys, Columbium, Molybdenum alloys, Tantalum alloys, Tungsten, Material forming, Mechanical properties, Yttrium, Nozzles, Coatings, Films, Extendable structures, Foams, Composite materials.

18. Military Sciences and Operations

AD-608 479 Div. 18, 20, 33
OTS Prices: HC $1.00/MF $0.50

Research Triangle Inst., Durham, N. C.
RADIOLOGICAL RECOVERY CONCEPTS, REQUIREMENTS, AND STRUCTURES.
Summary rept. (Final).,
by J. T. Ryan, J. D. Douglass, Jr., and H. E. Campbell.
16 Oct 64, 8p
Contract OCD PS64 56, Task 3233B

Unclassified report

Descriptors: (*Civil defense systems, Recovery), (*Nuclear warfare, Recovery), (*Radioactive fallout, Decontamination), Structures, Radiological contamination, Costs, Feasibility studies, Survival, Urban areas.

The report is a summary of the two volume final report. The objective of the research was to analyze decontamination operations to determine their costs, feasibility, and potential contribution to accelerating recovery in a postattack fallout environment. This objective was met by determining alternative times, and associated decontamination resources, required to resume a work schedule, as a function of decontamination effort. The principal measure of effectiveness was the time saved in resuming the schedule.

AD-608 579 Div. 18, 26
OTS Prices: HC $3.00/MF $0.75

RAND Corp., Santa Monica, Calif.
THE CHANGING RELATIONSHIP BETWEEN THE AIR FORCE AND THE AEROSPACE INDUSTRY,
by Robert E. Bickner. Jul 64, 85p RM-4101-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Air force procurement, Defense systems), (*Government procurements, Defense systems), (*Aircraft industry, Government procurement, Spacecraft, Costs, Management control systems, Weapon systems, Military requirements, Quality control, Industrial production, Performance (Engineering), Air force budgets.

An effort is made to identify the recent trends which are fundamentally altering the nature of the Air Force-aerospace industry relationship, to indicate basic dilemmas which are the roots of current difficulties in the relationship, and to suggest alternatives available for maintaining the efficiency of the relationship. The report is addressed to all those in the Air Force and industry, and to those students of economics and Government, who are concerned with the fundamental character of the relationship. Some of the proposals contained herein are admittedly unconventional and controversial, but many of the problems may in fact call for unconventional solutions. In any event, the main purpose is to stimulate thought and discussion about major Air Force-industry problems rather than provide set answers.

AD-608 745 Div. 18, 8, 30
OTS Prices: HC $2.00/MF $0.50

Applied Science Associates, Inc., Valencia, Pa.
THE MAINTENANCE TASK SIMULATOR-1 (MTS-1): A DEVICE FOR ELECTRONIC MAINTENANCE RESEARCH.
Final rept. for Oct 62-Jun 64,
by Thomas K. Elliott and John D. Folley, Jr.
Oct 64, 42p
Contract AF33 657 10052, Proj. 1710, Task 171004
AMRL TR64 99

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Maintenance, Electronic equipment), (*Simulators, Electronic equipment), (*Electronic equipment, Maintenance), Checkout equipment, Modules (Electronic), Maintenance equipment, Maintenance personnel.

The Maintenance Task Simulator (MTS-1) is a low priced task simulation device, specially constructed for research on performance aids used in conjunction with electronic maintenance. The device can present many complex electronic control-display panel configurations. The control-display panel is composed of a variety of modules which may contain a control or display or be blank. The device also contains sensing and recording circuitry, which provides a time-referenced record of control positions and sequence of manipulations by the subject. The device can support such research as determining the various skills and concepts required by the technician in performing various levels of electronic maintenance and developing effective techniques for evaluating the proficiency of electronic maintenance personnel. The logical next step would be to modify the MTS-1 for research on malfunction isolation tasks, ie, the portion of the troubleshooting task conducted behind the front panel, after localization has been done, up to but not including the point of replacing the defective component. (Author)

19. Navigation

AD-608 703 Div. 19, 9
OTS Prices: HC $3.00/MF $0.75

Aeronautical Research Associates of Princeton, Inc., N. J.
ON THE MOTION WITHIN FLUID GYROSCOPES,
by Martin Fiebig. Aug 64, 85p ARAP-62
Contract AF49 638 1262
AFOSR 64 1457

Unclassified report

Descriptors: (*Gyroscopes, Fluid mechanics), Motion, Fluid flow, Cylindrical bodies, Incompressible flow, Laminar boundary layer, Viscosity, Velocity, Reynolds number, Momentum, Axially symetric flow, Integral equations, Integral transforms, Partial differential equations, Time lag theory.

The flow field which results from the disturbance of an initially laminar, viscous, incompressible sink flow through a cylindrical chamber is investigated. The disturbance considered may arise either from an impulsive motion or a harmonic oscillation of the device perpendicular to its axis of symmetry. The results of this investigation indicate the general behavior of the response of the flow field within such a device over a wide range of the governing parameters. In particular, it is shown that the mean time-or phase-lag of the motion is nearly identical with the inviscid transport time, while the mean amplitude of the response is almost proportional to the inverse distance from the axis when the visco-geometric parameter is smaller than 1/10. Hence, such devices may possibly be used to detect extremely small rates of rotation and may act in a certain sense as excellent gyroscopes. (Author)

AD-608 805 Div. 19
OTS Prices: HC $2.00/MF $0.50

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF MODULAR MONITOR SYSTEM INDICATOR.
Final rept.,
by George W. Gonyou. Oct 64, 39p
Proj. 222 240 01V
FAA RD64 144

Unclassified report

See also AD-412 527.

Descriptors: (*Navigational aids, Monitors), Display systems, Modules (Electronic), Control, Control panels, Airports, Panel boards (Electricity).

The purpose was to conduct an evaluation of a development model of the Modular Monitor System Indicator to determine its suitability as a replacement for the Monitor Indicator Units presently in service use at FAA Flight Service Stations. Two panels, the Dial Monitor and Monophone Panel, Type FA-5115/A and VORTAC Monitor Panel, Type FA-5116/A, are presently in service use at FSS's to perform the control and monitor functions. The Modular Monitor System Indicator (MMSI) was developed by the Bendix Corporation, York Division, York, Pennsylvania. Although the developmental model Modular Monitor System Indicator is suitable as a replacement for the Monitor Indicator Units presently in service use, design changes are desired to improve the suitability of future models. The principal design changes are: (a) Reduction of the panel height from 7 inches to 5-1/4 inches and provisions for monitoring and controlling 21 NAVAID's within a console panel space of 15-3/4 inches. (b) Use of a single standard panel configuration. (c) Interchangeable NAVAID Plug-in Modules and construction of the Common Equipment in a plug-in modular form. (d) Provisions for monitoring the circuits connecting the MMSI to the NAVAID site.

20. Nuclear Physics and Nuclear Chemistry

AD-608 612 Div. 20, 8, 25
OTS Prices: HC $3.00/MF $0.75

Brown Univ., Providence, R. I.
RADIATION EFFECTS IN SEMICONDUCTORS: (SUMMARY REPORT, JUNE, 1964).
by J. J. Loferski. Oct 64, 58p
Contract AF33 657 8974, Proj. 7885, Task 7885 01
ARL 64 151

Unclassified report

Descriptors: (*Semiconductors, Radiation damage), (*Elementary particles, Energy), Van de Graaff generators, Circuits, Electric currents, Voltage, Stabilization, Electrons, Protons, Gamma rays, Proton reactions, Gallium alloys, Arsenic alloys, Photoelectric effect, Electron beams.

The first part of the report contains information of use to persons engaged in irradiation experiments involving electrons or protons with energies between 0 and 400 KeV. Range energy curves for these particles based on a critical review of the literature are presented. A circuit for stabilizing the output voltage and current of a Van De Graaff machine is described. The results of a calibration of the machine based on a p, gamma reaction are presented. The second section describes radiation damage experiments in GaAs based on studies of changes in recombination radiation induced by electron beam injection. The third section is concerned with an experiment designed to demonstrate the existence of a photovoltage between two parts of a semiconductor with different lifetimes, the lifetime difference having been produced by irradiation. (Author)

AD-608 695 Div. 20
OTS Prices: HC $1.00/MF $0.50

Yale Univ., New Haven, Conn.
FINAL REPORT. PARTICLE PHYSICS, BIBLIOGRAPHY OF PUBLICATIONS.
by Gregory Breit. 1961, 11p
Contract Nonr1338 00

Unclassified report

Descriptors: (*Nuclear physics, Bibliographies), (*Bibliographies, Nuclear physics), Nuclear scattering, Nuclear particles, Linear accelerators, Isotopes, X-ray spectrum, Polarization, Electron capture, Nucleons, Protons, Excitation, Nuclear reactions.

AD-608 720 Div. 20, 2
OTS Prices: HC $1.00/MF $0.50

Naval Research Lab., Washington, D. C.
FILTER PACK TECHNIQUE FOR CLASSIFYING RADIOACTIVE AEROSOLS BY PARTICLE SIZE. PART 2 ISOTOPIC FRACTIONATION WITH PARTICLE SIZE,

by L. B. Lockhart, Jr., R. L. Patterson, Jr., and A. W. Saunders, Jr. 28 Oct 64, 16p
Contract AT49 7 2435, Proj. RR004 02 42 5151
NRL 6164

Unclassified report

Descriptors: (*Fission products, Particle size), (*Aerosols, Radioactive isotopes), Distribution, Separation, Gas filters, Radioactive fallout, Radioactivity, Air pollution, Collecting methods, Radiochemistry, Analysis.

An evaluation of the relative distribution of some long-lived airborne fission products among several ranges of particle sizes was carried out by the radiochemical analysis of individual air filters exposed in a pack. The relative quantities of radioactivity deposited on each of the filters in the packs was found to vary considerably throughout 1963; however, each of the individual isotopes behaves in much the same manner so that the fractionation of isotopes relative to one another is slight. Though isotopic fractionation by filters of different characteristics has not been found to be of great significance, there are indications that a more sensitive separating procedure may show more differences between particles in the extreme size ranges. The differences are not sufficient to invalidate the use of collections made on less than perfect filters for estimating the relative fission product concentrations in the air or for the approximate age determination of bomb debris. (Author)

AD-608 769 Div. 20
OTS Prices: HC $1.00/MF $0.50

Rochester Univ., N. Y.
'TARGET MASS' AND 'EFFECTIVE TARGET MASS',
by M. F. Kaplon and M. L. Shen. 5 Nov 64, 16p
URPA-62
Contract AT30 1 875; Grant AF AFOSR439 63

Unclassified report

Descriptors: (*Pions, Nuclear cross sections), (*Nuclear cross sections, Pions), Nucleons, Mass number, Nuclear reactions, Mass-energy relation, Recoil atoms, Nuclear physics.

The concept of 'Target Mass' and 'Effective Target Mass' is discussed. Evidence is presented which questions the validity of attempting to relate the 'Effective Target Mass' to the concept of a virtual pion surrounding the nucleon. Relations between the 4-momentum transfer, the quantity (E - P cos theta) of the recoil nucleon and the 'Effective Target Mass' are derived which show in conjunction with experimental data that the 'Effective Target Mass' of the order of a pion mass occurs accidentally. (Author)

AD-608 770 Div. 20, 4
OTS Prices: HC $2.00/MF $0.50

Rochester Univ., N. Y.
THE ENERGY DEPENDENCE OF THE ABUNDANCE OF LITHIUM, BERYLLIUM, AND BORON IN THE PRIMARY COSMIC RADIATION: OBSERVATIONS AT FORT CHURCHILL,
by G. D. Badhwar, S. N. Devanathan, and M. F. Kaplon. 13 Oct 64, 40p URPA-58
Grant AF AFOSR439 63

Unclassified report

Descriptors: (*Cosmic rays, Spectroscopy), (*Lithium, Cosmic rays), (*Beryllium, Cosmic rays), (*Boron, Cosmic rays), Energy, Nuclear particles, Atmosphere, Spallation, Ionization, Measurement, Astrophysics, Nuclear physics, Geophysics.

The relative abundance of Lithium, Beryllium, Boron, and the S-group nuclei has been determined at two different energies with the help of a pure nuclear emulsion stack flown from Fort Churchill, Canada (lambda = 70.5) on 4 August, 1962 under a total of 4.7 g/sq. cm of residual atmosphere. The ratio of the L to S nuclei, LS, at the top of the atmosphere between 200-700 Mev/n and > 700 Mev/n was determined as 0.41 ± 0.08 and 0.19 ± 0.03 respectively. The results of both the absolute flux values of L and S-group nuclei as well as their ratios are in accord with other investigations. Combined with the evidence from the measurements of He3He in the same stack, our results indicate that low energy cosmic ray nuclei have traversed about twice as much hydrogen as high energy particles. The results rule out an accelerating mechanism of the Fermi type but may be explained by a source-trapping mechanism. (Author)

AD-608 780 Div. 20
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
EFFECTS OF ENERGETIC PHOTON IRRADIATION ON GERMANIUM.
Physical Sciences Research Papers,
by P. H. Hannaway, H. M. DeAngelis, and E. Y. Wang.
Oct 64, 26p
Proj. 5620
AFCRL 64 839; AFCRL PSRP57

Unclassified report

Descriptors: (*Germanium, Radiation damage), (*Radiation damage, Photons), Semiconductors, Gamma rays, X rays, Electron transitions, Temperature, Electrical properties, Resistance (Electrical), Hall effect, Electromagnetic waves.

N-type germanium samples have been exposed at 30C to gamma rays from a 6100 curie Co60 source and X-rays (up to 3 Mev) produced by bombardment of a tungsten target with 3-Mev electrons from a Van de Graaff generator (model KN). From the temperature dependence of carrier concentration for defect levels induced by the X-ray irradiation, evidence has been presented for defect levels at E sub c - 0.2 ev and E sub v + 0.26 ev. These levels have been observed in Co60 irradiations. From a study of carrier removal rate as a function of the Fermi level, evidence has also been presented for the existence of a very shallow level, E sub c - 0.07 ev, induced by Co60 gamma rays.

AD-608 814 Div. 20
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
YIELD OF THE HIROSHIMA BOMB DERIVED FROM PRESSURE RECORD,
by H. L. Brode. Sep 64, 37p RM-4193-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Nuclear bombs, Explosion effects), Nuclear explosions, Blast, Pressure gages, Telemeter systems, Signals, History, Mathematical analysis, Japan.

The microphone gauge air pressure record made from telemetered signals from a parachuted canister near bomber altitude provides a time history of the passage of the air blast and an opportunity to measure the yield of the Hiroshima nuclear explosion. Previous estimates were made without benefit of more recent blast measurements on which to base the calculations. (They may, however, have been made with more precise knowledge of the gauge

altitude and slant range and of the air temperatures and winds existing at the time of burst.) A best guess on the basis of the data and analysis used in these present notes appears to be 14 ± 3 KT, which compares well with the previous blast yield estimate of 18.5 ± 5 KT and a radiochemical yield of 13 ± 2 KT. (Author)

AD-608 822 Div. 20, 8
OTS Prices: HC $1.00/MF $0.50

Microwave Physics Lab., Mountain View, Calif.
COLLISION FREQUENCY STUDY.
Quarterly progress rept. no. 2, 1 Jul-31 Aug 57,
by Robert M. Hill. 14 Oct 57, 13p
Contract AF04 647 113

Unclassified report

See also AD-420 794.

Descriptors: (*Electrons, Electron transitions), Water vapor, Carbon dioxide, Electron beams, Measurement, Absorption, Diffusion, Pumping (Electronics), Plasma medium, Anistropy, Cyclotron resonance phenomena, Scattering, Microwave frequency, Electric discharges, Inelastic scattering, Carbon compounds, Monoxides, Mathematical analysis, Integrals, Power series, Series.

The objectives in this program are to measure the effective collision frequency of electrons in water vapor, and in commercially available carbon dioxide and carbon monoxide, in the electron energy range corresponding to temperatures from room temperature to 400C. Measurements of the collision frequency are to be made with pure samples of these gases as well as mixtures thereof.

AD-608 871 Div. 20, 16
OTS Prices: HC $1.00/MF $0.50

Boeing Co., Seattle, Wash.
FRACTIONAL CELL LETHALITY APPROACH TO SPACE RADIATION HAZARDS,
by S. B. Curtis, D. L. Dye, and W. R. Sheldon.
Oct 64, 17p D2-90611

Unclassified report

Presented at the Symposium on Protection Against Radiations in Space (2nd) Gatlinburg Tenn. Oct 64.

Descriptors: (*Performance (Human), Radiation hazards), (*Radiation hazards, Astronauts), (*Astronauts, Radiation hazards), (*Test methods, Radiation hazards), Radiobiology, Solar flares, Particles, Alpha particles, Protons, Lethal dosage, Cells (Biology), Kidneys, Space flight, Mathematical analysis, Space environmental conditions.

A method of radiation hazard evaluation has been introduced in which the fractional number of inactivated cells of an organ is calculated. This fractional cell lethality (FCL) depends only on the particle energy spectrum and the probability of cell inactivation. Recent data on inactivation cross sections of human kidney cells have been used to calculate the contribution of protons, alpha particles, and M-group particles to the FCL of the kidney. The results indicate that the proton and alpha particle contributions would have been the same o order of magnitude for the 12 November 1960 giant solar flare and their relative contribution does not vary much with shielding thickness. For a seated astronaut, the FCL values are on the order of 5 percent under reasonable shielding at points 4 and 6 cm inside the body at the waist. When data on inactivation cross sections become available on more critical organs, containing cells not replaced by the body, this approach may yield a realistic evaluation of the hazard from high-LET radiation on extended space missions. (Author)

AD-608 899 Div. 20, 25
OTS Prices: HC $1.00/MF $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
CONTROLLED ELECTRON BUNCHER,
by William C. Quinn and Frank E. Welker.
Oct 64, 23p
Proj. 5573, Task 557303
RADC TDR64 453

Unclassified report

Descriptors: (*Pulse generators, Electron beams), (*Electron accelerators, Control systems), (*Electron beams, Particle accelerators), Storage, Electron guns, Electron optics, Electron tubes, Modulation, Modulators, Radar, Operation, Density, Electrodes, Particle accelerators, Models (Simulations), Electric fields, Magnetic fields.

A method is described for forming and accelerating isolated high density bunches of electrons. The device is capable of either repetitive or single-shot operation. A theoretical treatment is given and experimental results are discussed. Nine experimental models were fabricated and the principles of operation were demonstrated. (Author)

21. Nuclear Propulsion

AD-608 565 Div. 21, 12, 17
OTS Prices: HC $4.00/MF $1.00

AiResearch Mfg. Co., Phoenix, Ariz.
MASS-TRANSFER TESTS WITH TWO-PHASE FLOW,
by E. A. Kovacevich and R. L. Salley. 20 Nov 64,
131p SY-5463-R
Contract AF33 657 8954, Proj. 3145, Task 314511
APL TDR64 119

Unclassified report

Descriptors: (*Spacecraft nuclear propulsion, Heat exchangers), (*Refractory metal alloys, Compatibility), Niobium alloys, Zirconium alloys, Molybdenum alloys, Titanium alloys, Phase studies, High-temperature research, Boiling, Boilers, Fluid flow, Corrosion, Heaters, Tests, Impurities, Transport properties, Liquid metals, Potassium.

A closed loop fabricated entirely from Cb + 1.0 w/o Zr material was operated with potassium under dynamic two-phase (liquid and vapor) conditions. A test section containing orifices and Mo + 0.5 w/o Ti test specimens was placed in the vapor stream. The maximum fluid temperature of 1950F and the maximum vapor temperature of 2000F were maintained throughout the test. Condensing occurred at 1770F. The test was conducted for 307 hours of the scheduled 1,000 hours. The test was terminated due to a twisted ribbon failure in the boiler section, which resulted in a flow restriction. The test was conducted in a purified argon atmosphere and was monitored for impurities during the test. Despite the precautions taken to minimize contamination of the loop material, contamination of the refractory alloy existed. Under the test conditions, there was no evident corrosion and/or erosion of the loop materials. (Author)

22. Ordnance

AD-608 535 Div. 22, 26
OTS Prices: HC $0.75/MF $0.50

Watervliet Arsenal, N. Y.
EXPLOSIVE FORMING OF GUN TUBE SECTIONS.
Technical rept.,
by A. A. Campione and V. J. Colangelo. Jul 64, 25p
Proj. 1C5 42703D343 02
WVT II6409

Unclassified report

Descriptors: (*Gun barrels, Explosive forming), (*Explosive forming, Gun barrels), Mechanical properties, Steel, Processing, Ductility, Heat treatment, Tensile properties, Impact shock.

Application of explosive forming techniques to the fabrication of the 120mm Heavy Assault Weapon (H.A.W.) gun tube sections resulted in the satisfactory completion of four (4) out of ten (10) tubes in an experimental evaluation. Tubes were radially expanded from tubular blanks of AISI 4140 to the required dimensions, thus eliminating considerable machining time and material cost. The complete fabrication sequence developed on contract has been tabulated for each tube. Room temperature tensile data and impact data at room temperature and -40F from the minimum and maximum expansion areas are presented for representative tubes.. (Author)

AD-608 885 Div. 22, 15
OTS Prices: HC $5.00/MF $1.25

California Univ., Berkeley.
UNDERGROUND EXPLOSION THEORY,
by C. B. Morrey, Jr., Edmund Pinney, R. G. Stoneham, P. L. Chambre, and R. M. Lakness. Apr 52, 186p
Contract Nonr22204, Projs. NR340 040, 1 9
WT 369

Unclassified report

Rept. on Operation JANGLE, Nevada Proving Grounds, Oct-Nov 51.
Declassified 11 Jan 59.

Descriptors: (*Underground explosions, Mathematical analysis), (*Nuclear explosions, Underground explosions), (*Explosions, Theory), Surface burst, Soils, Soil mechanics, Strain (Mechanics), Stresses, Statistical mechanics, Integral equations, Matrix algebra.

Contents: Theoretical studies of the shock wave; Application of the Kirkwood-Brinkley method to the theory of underground explosions; Notes on surface and underground explosions: Predictions for the underground shot.

23. Personnel and Training

AD-608 589 Div. 23
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
EMPHASIZING THE AUDIO IN THE AUDIO-LINGUAL APPROACH.
Scientific rept.
by Gerald Newmark and Edward Diller. 6 Oct 64, 7p
SP-1470

Unclassified report

Pub. in Modern Language Journal, Jan., 1964, p. 18-20.

Descriptors: (*Language, Education), (*Education, Language), Learning, Hearing, Auditory perception, Training, Speech, Training devices.

The neglect of listening comprehension in the audio-lingual approach to the teaching of foreign languages is pointed out. The need to develop listening comprehension, not only as a foundation for speaking, but as a skill in its own right, is stressed. The creation of new materials that are geared to the specific objectives and requirements of this skill, together with specific ways of adapting current materials to emphasize the audio in the audio-lingual approach are suggested.

AD-608 686 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Training Research Lab., Univ. of Illinois, Urbana.
COMPUTER-BASED SYSTEMS: THE NEW RESEARCH AID.
Technical rept. no. 6,
by Daniel J. Davis and Lawrence M. Stolurow.
Nov 64, 16p
Contract Nonr3985 05

Unclassified report

Rept. on Research on Pre-Programmed Self-Instruction and Self-Programmed Individualized Education.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Teaching machines, Programming (Computers)), (*Learning, Teaching machines), Education, Achievement tests, Aptitude tests, Personality, Performance (Human), Psychometrics, Control systems, Students, Symposia.

Two arguments are presented in connection with programed instruction; one concerns its past, the other its future. The first, and historical point, is that programed instruction has already served the study of learning by focusing attention on the problem of individual differences. Although Tolman (1936) and Hull (1943), for example, acknowledged the relationship between individual differences and learning, little real attention went into the explication of this relationship until the advent of programed instruction. The second, and prospective argument, is that computer-based teaching machine systems will contribute to experiments in basic learning, and, in fact, will permit the study of variables relating to response contingencies that can not be studied in any other way. Programed instruction has helped in uniting two fields of psychology that have developed separately, but that need to be related in application (Stolurow, 1960; 1961): these are the field of psychometrics, which has concerned itself with individual differences in abilities and achievement, and the field of learning which, to a large extent, has ignored individual differences.

AD-608 771 Div. 23, 26, 32
OTS Prices: HC $2.00/MF $0.50

Lebergott (Stanley), Middletown, Conn.
METHODS OF FORECASTING SHORT TERM UNEMPLOYMENT CHANGE,
by Stanley Lebergott. Oct 64, 30p
Contract MDTA33 64

Unclassified report

Descriptors: (*Manpower studies, Mathematical prediction), (*Personnel management, Manpower studies), Management engineering, Labor, Commerce, Economics, Mathematical models, Inventory analysis.

The present report outlines preliminary findings in a study of how to develop a practical model for the forecasting of short term unemployment changes. Since the varying tide of demands for GNP final goods and services is surely central in any explanation of variations in employment and unemployment, the author began with one approach to measuring these forces. The use was explored of manufacturers' unfilled orders (in the form of a ratio of orders minus inventories to sales). This was done because variations in factory hirings are sparked by orders, and because these in turn stimulate demands on suppliers (e.g. mining) and distributors (e.g. transport, trade) of factory products. The ratio that was derived proves to be highly correlated with unemployment levels since 1947, at -.865. A second category of variables investigated are those that relate to the gradual diffusion of business cycle change--among firms, industries, areas, etc. A third category of variables studied relate to the persistence of business cycle change. For a persistent trend of employment, even if small, reports something just as relevant to forecasting future trends as the mere magnitude of change in a given period.

AD-608 777 Div. 23
OTS Prices: HC $2.00/MF $0.50

Naval Training Device Center, Port Washington, N. Y.
DEVICES UNDER DEVELOPMENT. TRAINING DEVICE GUIDE, SUPPLEMENT NO. 1.
Change page notice no. 6.
Nov 63, 30p
NAVEXOS P530 2S1R6

Unclassified report

Descriptors: (*Training devices, Indexes), Navy training.

AD-608 792 Div. 23, 1
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
PILOT AIRCRAFT AIMING PERFORMANCE.
Final rept.,
by Melvin H. Rudov. Sep 64, 21p
Proj. 7194, Task 71641
AMRL TR64 87

Unclassified report

Descriptors: (*Pilots, Performance (Human)), (*Flight testing, Positioning reactions), (*Positioning reactions, Pilots), Aircraft, Personnel, Vibration, Mechanical waves, Motor reactions, Visibility, Visual acuity, Turbulence, Human engineering.

Six test pilots, using a specially instrumented F-100D, flew nine dives each at at a ground target. The

task was to align the aircraft with the target as quickly as possible. Initial altitude (7,000, 8,000, or 9,000 feet), dive angle (10, 20, or 30 degrees), slant range at alignment (6,035 to 50,869 feet), and individual pilot differences did not affect accuracy of alignment. Turbulence, as judged by the pilots, decreased both accuracy and task time. Mean task performance time was approximately nine seconds and mean accuracy was approximately five minutes visual angle. (Author)

AD-608 804 Div. 23, 28
OTS Prices: HC $1.00/MF $0.50

Personnel Research Lab. (6570th), Aerospace Medical Div., Lackland AFB, Tex.
APPLICATION OF A PSYCHOMETRIC-CLINICAL APPROACH TO PERSONNEL SELECTION FOR COUNTERINSURGENCY DUTY.
Technical rept.,
by George K. Cantrell, Fred E. Holdrege, Roy A. DeGaugh, and Cecil J. Mullins. Oct 64, 16p
Proj. 7717, Task 771707
PRL TR64 24

Unclassified report

Descriptors: (*Counterinsurgency, Personnel management), (*Military personnel, Counterinsurgency), (*Psychometrics, Counterinsurgency), Performance (Human), Performance tests, Medical personnel, Military psychology, Personality, Attitudes, Tests, Aptitude tests, Abnormal psychology, Military requirements.

Volunteers for assignment to counterinsurgency duty were screened by a combination of psychological tests and interview assessments. The tests included measures of aptitude, ability, personality, attitude, interests, and biographical data. In the initial phases an assessment score was obtained by combining the ratings of 3 interviewers: a psychiatrist, a clinical psychologist, and a personnel psychologist. This team rating was used both for selection of candidates and as a criterion for validating test and personal data variables. Through successive regression analyses, variables not contributing to prediction of the criterion were eliminated. The final products were 2 screening batteries that might be field-administered and scored: an officer selection battery and an airman selection battery. (Author)

24. Photography and Other Reproduction Processes

No Entries

25. Physics

AD-608 485 Div. 25
OTS Prices: HC $1.00/MF $0.50

Columbia Univ., New York.
THE ARROW OF TIME,
by L. Brillouin. 1964 19p
Contract Nonr266 56
Unclassified report

Prepared for presentation at the International Congress for Logic, Methodology and Philosophy of Science, Jerusalem, Aug 64.
Rept. prepared in cooperation with the National Academy of Sciences, Washington, D. C.

Descriptors: (*Physics, Irreversible processes), (*Time Irreversible processes), Quantum mechanics, Wave transmission, Relativity theory, Nuclear physics, Field theory.

A philosophical discussion of time irreversibility is presented. Experimental results related to atomic or subatomic structures and their significance about time irreversibility are examined. The emission of light by atoms, philosophical significance of Einstein's formulas, role of boundary conditions in classical mechanics, wave progation and the theory of relativity are also discussed.

AD-608 487 Div. 25, 4
OTS Prices: HC $1.00/MF $0.50

Queen's Univ., Belfast (Northern Ireland).
THE PHOTOIONIZATION OF SODIUM,
by Anne H. Boyd. 1964, 16p
Grant AF EOAR63 85
AFCRL 64 757
Unclassified report

Descriptors: (*Sodium, Ionization), (*Photochemistry, Sodium), Atomic orbitals, Valence, Electron transitions, Field theory, Dipole moments, Polarization, Absorption, Quantum statistics, Great Britain.

The photoionization cross-section of sodium was calculated for radiation of wave-length greater than 160A. In the case of the 3s - epsilon-p transition the bound and free wave functions were based on a potential in which a polarizability term and a term to allow for exchange are included. The contribution to the cross-section from the shell electrons was estimated by means of approximate formulae using Hartree-Fock wave functions for the initial states and Coulombic wave functions for the final states. Both the dipole length and the dipole velocity 3s - epsilon-p transition matrix elements were evaluated. The results obtained are in good accord, the former matrix elements leading to an absorption cross-section of 13.6 x 10 to the -20 power sq cm at the spectral head, the latter 12.6 x 10 to the -20 power sq cm. (Author)

AD-608 488 Div. 25, 4, 17
OTS Prices: HC $2.00/MF $0.50

Queen's Univ., Belfast (Northern Ireland).
CONFIGURATION INTERACTION IN MAGNESIUM,
by R. J. S. Crossley. 1964, 23p
Grant AF EOAR63 85
AFCRL 64 875
Unclassified report

Descriptors: (*Magnesium, Atomic energy levels), (*Atomic orbitals, Magnesium), Atomic energy levels, Electrons, Ionization potentials, Field theory, Perturbation theory, Operators (Mathematics), Matrix algebra, Functions, Phase studies, Great Britain.

Zero-order eigenfunctions and first-order energies are obtained in the hydrogenic Z-expansion scheme for magnesium-like systems. Full account is taken of configuration interaction arising in Russell-Saunders coupling. Special attention is given to the configuration pd and to problems of phase. (Author)

AD-608 490 Div. 25, 8, 12, 16, 30
OTS Prices: HC $4.00/MF $0.75

University of Southern California, Los Angeles Engineering Center.
CONSOLIDATED QUARTERLY PROGRESS REPORT OF RESEARCH ACTIVITY.
Rept. no. 1, 1 Jul-30 Sep 64,
by D. B. Wittry, T. S. Hartwick, F. A. Kroger, Z. A. Kaprielian, and H. H. Kuehl. 30 Sep 64, 106p
Grants AF AFOSR75 63, AFOSR76 63
Unclassified report

Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena; Atomic Energy Commission, Washington, D. C., and National Science Foundation, Washington, D. C.

Descriptors: (*Solid state physics, Scientific research), (*Electromagnetic waves, Scientific research), (*Plasma physics, Scientific research), (*Communication theory, Scientific research), Semiconductors, Magnetism, Crystals, Superconductors, Plasma medium, Plasma oscillations, Wave transmission, Propagation, Millimeter waves, Coding, Control systems, Guidance, Spacecraft, Guided missiles, Tracking, Mathematical models, Cardiovascular systems, Detection, Signals, Identification systems, Television communication systems, Optical properties.

A summary is given of the research activity conducted during the period July-September, 1964. Topics include: Solid state research (semiconductors, magnetism, imperfections in crystals, superconductivity); Electromagnetic theory and plasmas (plasmas, radiation and diffraction of electromagnetic waves, propagation of electromagnetic waves, millimeter waves); Information sciences (control systems, information processing and signal detection, coding theory, optical processing).

AD-608 491 Div. 25
OTS Prices: HC $3.00/MF $0.75

RCA Labs. Div., Radio Corp. of America, Princeton, N. J.
INVESTIGATION OF TWO-CARRIER INJECTION ELECTROLUMINESCENCE.
Scientific rept. no. 2, 15 Sep 63-14 Sep 64,
by A. G. Fischer, J. N. Carides, J. Dresner, W. H. Fonger, and G. J. Goldsmith. 15 Oct 64, 65p
Contract AF19 628 3866, Proj. 4608, Task 460805
AFCRL 64 858
Unclassified report

Initial distribution copies contain color which will be shown in black-and-white when it is necessary to reprint.
See also AD-437 573.

Descriptors: (*Electroluminescence, Injection), (*Semiconductors, Electroluminescence), Crystal growth, Crystals, Zinc compounds, Sulfides, Zinc alloys, Selenium alloys, Tellurium alloys, Rare earths, Films, Voltage, Metals, Luminescence, Optics.

Intense yellow injection electroluminescence starting at 1.35 volts has been discovered and studied in physical inversion layers of metal-semiconductor contacts between high-work-function metals and n-type ZnSe. Yellow injection electroluminescence has also been found in quasihomojunctions between n-type ZnSe and p-type ZnTe grown by a new epitaxial process. For unambiguous distinction of the various injection electroluminescence effects which can be produced in one n-type ZnSe crystal, a comparative study was undertaken which yielded a set of simple criteria. N-type ZnTe crystals were produced for the first time, and the phase diagram of ZnTe was established. Optical measurements on ZnSe-ZnTe mixed crystals were undertaken. A comprehensive theory of the luminescence centers in ZnS-ZnSe mixed crystals has been worked out, which is applicable also to other mixed crystals. Rare-earth-doped, luminescent zinc sulfide crystals were grown from the melt, and work on Re-doped films was begun. (Author)

AD-608 493 Div. 25
OTS Prices: HC $1.00/MF $0.50

Hebrew Univ., Jerusalem (Israel).
THE EVALUATION OF THE OPTICAL CONSTANTS OF A THIN INHOMOGENEOUS LAYER.
Technical scientific note no. 1,
by E. Wajsberg. 1 Jul 64, 10p
Contract AF61 052 659
AFCRL 64 818

Unclassified report

Descriptors: (*Optical properties, Films), (*Films, Optical properties), Mathematical analysis, Boundary value problems.

The true optical constants of a thin inhomogeneous layer coated on a base may be evaluated from a knowledge of the magnitude and phase of the complex reflection coefficient and their derivatives with respect to film thickness. These measured quantities furnish sufficient information to determine the film constants without requiring knowledge of the substrate properties. (Author)

AD-608 506 Div. 25
OTS Prices: HC $2.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 22, 1 May-31 Jul 64.
Oct 64, 33p ML-1235
Contract Nonr225 48, Proj. NR373 361

Unclassified report

Descriptors: (*Microwave frequency, Scientific research), (*Acoustics, Amplifiers), (*Electromagnetic waves, Scientific research), (*Lasers, Ruby), Microwave amplifiers, Piezoelectric crystals, Semiconductors, Interferometers, Diffraction, Light, Electrons, Phonons, Quantum Mechanics, Magnetic fields, Ferroelectric materials, Quartz, Electron beams.

At the present time there are seven projects active under this contract: I. Acoustic wave amplification studies; II. Optical Masers; III. Diffraction of light waves by hypersound; IV. Transient effects in optical masers; V. Electron-phonon interactions; VI. Interaction of spin waves and electrons; VII. Geometrical Optics of Acoustic Waves.

AD-608 508 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

RIAS, Inc., Baltimore, Md.

COMPLEX-ION EMBRITTLEMENT OF SILVER CHLORIDE.
Technical rept. no. 4,
by A. R. C. Westwood, D. L. Goldheim, and E. N.
Pubh. Nov 64, 45p RIAS-TR-64-21
Contract Nonr4162 00

Unclassified report

To be pub. in Proceedings of Conference on 'Role of Grain Boundaries and Surfaces in Ceramics,' North Carolina State Univ., Nov 64.

Descriptors: (*Crystals, Brittleness), (*Silver compounds, Chlorides), Complex compounds, Ions, Single crystals, Fracture (Mechanics), Inhibition, Additives, Potassium, Cesium, Zinc, Cadmium, Mercury, Chemical bonds, Adsorption, Stresses.

It is demonstrated (1) that AgCl embrittlement in chloride environments can be prevented by the presence, in solution, of such inhibitor-ions as K(+), Cs(+), Zn(2+), Cd(2+), or Hg(2+), (2) that embrittlement can be induced by complex-ions of high positive charge, and (3) that monocrystals can be embrittled providing that they contain a preexisting crack. Studies of monocrystal fracture surfaces revealed that the fracture process is discontinuous. For this, and other reasons discussed, it is concluded that embrittlement cannot be explained on the basis of a dissolution-dependent mechanism, but is more likely to be associated with the adsorption of complex-ions of high charge in the vicinity of strained surface bonds. It is suggested that the charge on the complex induces a localized redistribution of the shared electrons constituting the bond, effectively reducing its strength, and causing the bond to break at an abnormally low stress level. (Author)

AD-608 514 Div. 25
OTS Prices: HC $3.00/MF $0.75

Hayes International Corp., Birmingham, Ala.
A STUDY OF THE RADIATIVE CHARACTERISTICS OF SHIELDED INFRARED SOURCES.
Final rept.,
by C. M. Askey, N. D. Gilliam, and J. L. Reid.
May 64, 98p Hayes-ER-649
Contract DA44 177TC805, Task 1D121401A14802
TRECOM TR64 25

Unclassified report

See also AD-426 787.

Descriptors: (*Infrared radiation, Electromagnetic shielding), (*Electromagnetic shielding, Infrared radiation), Infrared pulses, Distribution, Intensity, Mathematical prediction, Programming (Computers), Integral equations, Infrared research.

This final report gives an account of work performed since the interim report. The report is divided into two parts. Part I covers the consolidation, refinement, and increased versatility of empirical computer programs over initial efforts in the field of prediction of radiation patterns from shielded infrared sources. Part II presents the development of an analytical approach for the evaluation of shield configurations for infrared sources. This approach employs a set of complex integral equations relating shield geometry and radiative characteristics of the source to angular distribution of radiative energy. (Author)

AD-608 520 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

General Telephone and Electronics Labs., Inc.,

Bayside, N. Y.
STUDY OF ADSORN OF GASES ON SOLIDS IN THE HIGH VACUUM RANGE.
Scientific rept. no. 8,
by J. V. Florio and D. H. Baird. 30 Sep 64, 26p
GTEL-TR-64-255.8
Contract AF19 628 331, Proj. 5634, Task 563405
AFCRL 64 822

Unclassified report

See also AD-602 489.

Descriptors: (*Tungsten, Work functions), (*Silicon, Work functions), Vacuum, Carbon compounds, Monoxides, Oxygen, Adsorption, Single crystals, Filaments, Surface properties.

The work function of polycrystalline tungsten was measured, using the retarding field technique, as a function of the exposure to a carbon monoxide ambient. The work function was found to vary from 4.4 eV to 5.2 eV in going from an initially clean surface to one saturated with carbon monoxide. The successive adsorption of oxygen on a tungsten surface already saturated with carbon monoxide is inferred from the work-function data. The increase in work function (from 5.2 eV to 6.4 eV) is indicative of possibly a monolayer or more of adsorbed oxygen. The work functions for a clean (111) silicon surface, silicon exposed to 0.000003 torr-sec oxygen, and silicon exposed to 0.000009 torr-sec oxygen were found by the retarding field method to be 4.79 eV, 5.02 eV and 5.07 eV, respectively. (Author)

AD-608 536 Div. 25, 8
OTS Prices: HC $2/00/MF $0.50

hp associates, Palo Alto, Calif.
SEMICONDUCTOR MATERIALS.
Interim engineering rept. no. 4, 26 Mar-26 Sep 64,. 26 Sep 64, 42p
Contract NObsr89489, Proj. SR008 0301, Task 9475

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Semiconductors, Electroluminescence), (*Electroluminescence, Display systems), Materials, Gallium alloys, Arsenic alloys, Phosphous alloys, Diodes (Semiconductor), Single crystals, Emissivity, Quantum mechanics, Photons, Optical properties.

The feasibility of a practical solid state matrix display employing visible low voltage dc injection electroluminescence has been established. Displays consisting of integrated 5 x 7 arrays of square mesa el diodes have been constructed and tested. The resolution of the display is 32 picture elements per inch. They are easily switched and have high contrast. The uniformity is poor, reflecting the non-uniform optical quality of the GaAs-GaP raw material. Control displays fabricated with GaAs have good uniformity. A detailed study of the GaAs(1-x)P (x) alloy system shows that for dc current density of about 25 amperes/cm(2) optimum luminescent output is obtained in the spectral interval between 610 and 680 mu. The output measured under these conditions is found to be between 30 and 500 footlamberts, well in excess of this contract requirements. Although the state-of-the-art GaAs-GaP single crystal ternary alloys needs improvement, especially in optical uniformity, the contract purpose, as stated in Part 1 on page 1 of this report, can be considered accomplished. (Author)

AD-608 545 Div. 25, 9
OTS Prices: HC $2.00/MF $0.50

Gas Dynamics Lab.. Princeton Univ., N. J.
ON THE INTERACTIONS OF A SOLID BODY WITH A FLOWING COLLISIONLESS PLASMA,
by S. H. Lam and M. Greenblatt. Jul 64, 37p
AER-699
Contract AF49 638 1271
AFOSR 64 1421

Unclassified report

Presented at the International Symposium on Rarefied Gas Dynamics (4th), held in Toronto, Canada, Jul 64.

Descriptors: (*Geometric forms, Electrical conductance), (*Plasma sheath, Electrical conductance), Gas ionization, Gas flow, Plasma physics, Compressible flow, Electric fields, Ions, Charged particles, Wedges, Conical bodies, Spheres, Supersonic flow, Subsonic flow, Transonic flow, Theory.

An analysis is made for the nonlinear interaction between the gas dynamical and the electrostatic phenomena in the movement of a charged body in a rarefied plasma where the electrical field surrounding the body affects the trajectories of the charged particles. The analysis assumes collisionless plasma flow, a perfectly absorbing body surface, a negatively charged body, and electron temperature higher than ion temperature. For disturbance in a quasi-neutral region, both the ion and electron flow fields are irrotational, and under some conditions the two fields can be mathematically uncoupled. The governing equation for the uncoupled ion flow velocity potential is shown to be identical to that of an isothermal, irrotational compressible flow in ordinary gas dynamics. For disturbance in a sheath layer, Bohm's sheath criterion is recovered. The matching of the quasi-neutral solution to the sheath solution is presented. Illustrative examples are given for a wedge and a cone in supersonic flow and a sphere in low-speed flow.

AD-608 562 Div. 25, 15
OTS Prices: HC $4.00/MF $0.75

Naval Ordnance Lab., White Oak, Md.
TABLES OF THE DAVIDSON-COLE AND THE LOG GAUSSIAN DISTRIBUTION FUNCTIONS OF RELAXATION TIMES,
by James J. Lichter and George E. McDuffie.
3 Sep 64, 104p
Task R360FR105 027
NOL TR64 170

Unclassified report

Descriptors: (*Tables, Statistical functions), (*Relaxation time, Tables), (*Statistical functions, Relaxation time), Physics, Energy, Heat transfer, Absorption.

Several fields of experimental physics employ distribution functions of relaxation times to describe the processes of energy transfer. It is convenient to have tables of the values of these functions for different values of their parameters. This paper presents such tables of the asymmetric Davidson-Cole distribution and the symmetric log Gaussian distribution for various 'widths' of the distributions. (Author)

AD-608 569 Div. 25
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE.
Quarterly progress rept. for 1 Jul-30 Sep 64.
15 Oct 64, 6p
Contract AF19 628 500
ESD TDR64 560

Unclassified report

Descriptors: (*Bibliographies, Solid state physics), (*Solid state physics, Reports), Lasers, Semiconductor devices, Materials, Semiconductors, Crystals, Spectroscopy, Wave transmission, Magnetic properties, Magnetic resonance, Electron transitions, Scientific research.

Researches in the following fields are summarized: solid state device research; laser research; materials research; band structure and spectroscopy of solids; magnetism and resonance.

AD-608 604 Div. 25, 26
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ULTRASONIC EMITTERS WITH QUARTZ PIEZOELEMENTS OF Y-SECTION,
by A. P. Sviridov, E. A. Korepin and others.
19 Nov 64, 10p
FTD TT63 1226; TT 65 60259

Unclassified report

Unedited rough draft trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Priborostroenie (USSR) 1959, v. 2, no. 1, p. 34-37.

Descriptors: (*Piezoelectric crystals, Ultrasonic radiation), (*Quartz, Ultrasonic radiation), (*Ultrasonic radiation, Piezoelectric crystals), Intensity, Frequency, Excitation, Electric currents, Crystal structure, Oscillation, Sprays, Cleaning, USSR.

It was found that a quartz crystal cut along the y-axis and excited by an electric current along that axis yields ultrasonic radiations of about twice the intensity of similar crystals cut and excited along the x-axis. An interpretation of the mechanism of this phenomenon is given. It is calculated that a y-type crystal will radiate at the same frequency as an x-type crystal almost 1.5 times thicker.

AD-608 605 Div. 25
OTS Prices: HC $3.00/MF $0.75

Thermo Systems, Inc., Minneapolis, Minn.
RESEARCH ON THE DEVELOPMENT AND EVALUATION OF A TWO-SENSOR ENTHALPY PROBE.
Final rept.,
by L. M. Fingerson. Oct 64, 78p
Contract AF33 657 9917, Proj. 7063, Task 706303
ARL 64 161

Unclassified report

Descriptors: (*Plasma medium, Enthalpy), (*Probes (Electromagnetic), Enthalpy), (*Enthalpy, Probes (Electromagnetic)), Measurement, Transducers, Surface temperatures, Mathematical analysis, Electronic equipment, Platinum, Films, Errors, Torches.

The applicability of measuring plasma enthalpies with an immersion probe using two miniature heat flux transucers is investigated both analytically and experimentally. The transducers considered were 0.006 in. OD internally cooled insulating tubes with a platinum resistive film on the surface. The two-sensor technique involves making heat flux measurements to two identical bodies operating at different surface temperatures. The problem of survival in the plasma environment and the accuracy requirements for two-sensor measurements are investigated. Miniature sensor supports are tested in an Argon plasma. A heat flux traverse of an oxygen-acetylene torch with a sensor is presented, along with some two-sensor measurements in environments under 1,600F. An analytical error analysis of the two-sensor technique is presented to identify the accuracy needed for accurate enthalpy measurements. (Author)

AD-608 613 Div. 25, 8
OTS Prices: HC $2.00/MF $0.50

Microwave Lab., Stanford Univ., Calif.
CHARACTERISTICS OF THE PLASMA RESONANCE PROBE.
Interim technical rept.,
by R. S. Harp and F. W. Crawford. Oct 64, 46p
Contract AF33 616 8121, Proj. 7073, Task 707303
ARL 64 139

Unclassified report

Descriptors: (*Plasma oscillations, Probes (Electromagnetic)), (*Probes (Electromagnetic), Plasma oscillations), Plasma medium, Resonance, Electrons, Mathematical models, Electric fields, Plasma sheath.

The plasma resonance probe was first studied by Takayama and his coworkers in 1960. Since that time several attempts have been made to determine precisely the experimental and theoretical behavior of the resonance. This paper reviews the various contributions made so far, and develops further the explanation advanced in 1963 by Harp. Detailed experiments were carried out to confirm the predictions: (i) that the resonance frequency lies below the local electron plasma frequency, (ii) that it is dependent on probe potential and probe size and, (iii) that the resonance should be highly damped when probe dimensions are smaller than a few electronic Debye lengths. If the resonance probe is to be of great practical importance, a simplified theoretical model describing its behavior is desirable. The theory of such a model is presented and compared to experimental results. The paper concludes with a discussion of improved methods of applying the resonance probe, and suggests a ringing technique which provides electron density measurements in laboratory discharges in times of the order of a few cycles at the electron plasma frequency. (Author)

AD-608 624 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
SPIN-LATTICE RELAXATION OF Ti(+3) IONS IN CORUNDUM: TEMPERATURE DEPENDENCE AT 9 Gc FOR THETA = 0.
Scientific rept. no. 4,
by D. W. Feldman, D. C. Burnham, and J. G. Castle, Jr.
May 64, 20p
Contract AF19 628 1640, Proj. 4608, Task 460801
AFCRL 64 665

Unclassified report

Descriptors: (*Titanium, Corundum), (*Corundum, Paramagnetic resonance), (*Paramagnetic resonance, Relaxation time), Nuclear spins, Impurities, Aluminum compounds, Oxides, Crystal lattices, Temperature, Electrons, Atomic orbitals, Microwave spectroscopy, Resonance absorption.

Spin relaxation was measured at 9 Gc for several samples of titanium doped Al2O3, over the temperature range from 1.3K to 14K. The spin-lattice relaxation time, T sub1, for the portion of the paramagnetic resonance line at theta = 0 havine gsub// = 1.05 to 1.10, has values varying from 5 sec to 5 x 10 to the minus 9th power sec according to the expression 1/T sub 1 = B T + C T to the 9th power + D exp(- delta/T), where B = 0.13/sec K, C = 7 (10-4)/sec K to the minus 9th power, D = 2.5 (10to the 10th power)/sec,

and delta = 52 ± 1K. These results are discussed in terms of spin-lattice interactions for individual Ti(+3) ions. In particular, the value of delta is assigned to the spin-orbit splitting between the lowest pair of electronic doublets for the configuration which may be approximately described as 3d. Effects of covalency are mentioned. (Author)

AD-608 625 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Westinghouse Research Labs., Pittsburgh, Pa.
TEMPERATURE DEPENDENCE OF PARAMAGNETIC RELAXATION AT POINT DEFECTS IN VITREOUS SILICA.
Scientific rept. no. 5,
by J. G. Castle, Jr. and D. W. Feldman.
17 Jun 64, 21p
Contract AF19 628 1640, Proj. 4608, Task 460801
AFCRL 64 643
Unclassified report

Descriptors: (*Silicon compounds, Oxides), (*Paramagnetic resonance, Silicon compounds), Relaxation time, Temperature, Spin, Electrons, Crystal lattice defects, Resonances, Glass, Dioxides, Crystallography, Single crystals, Specific heat, Microwave spectroscopy, Absorption resonance.

Spin relaxation has been measured at 3 kOe and at lattice temperatures from 1.24K to 250K for the E' centers generated in one type of vitreous silica by 2 MeV gamma rays. An unusual temperature dependence was found in which the spin-lattice relaxation time varies roughly as T to the minus 2.5 power over most of the range. All of the data are accurately fitted by analytical functions derived from a coupling of the individual defect centers to the vitreous host involving excess local strain due to mechanical resonances of about 4.1 x 10 to the 11th power cps and 6.0 x 10 to the 12th power at each E' center. The strength of the coupling and the characteristic frequencies of mechanical resonance are similar to those in crystalline SiO2. (Author)

AD-608 626 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SOUND PROPAGATION IN RAREFIED GASES.
Final rept.,
Nov 64, 82p BBN-1169
Contract Nonr3697 00, Task NR061 130
Unclassified report

Descriptors: (*Sound, Propagation), Gases, Acoustics, Attenuation, Kinetic theory, Pressure, Simulation, Molecules, Surfaces, Mathematical analysis, Transmitter-receivers, Microphones, Measurement, Vacuum, Sound transmission.

A study of sound propagation in rarefied gases is described with particular emphasis on the propagation in the geometrical relaxation regime where the sound carrying molecules do not suffer intermolecular collisions during the flight from the transmitter to the receiver. The propagation is characterized by the attenuation and the phase parameters. The dependence of these dispersion parameters on the separation between the transducers, the velocity distribution of the molecules subsequent to their interaction with the transmitter surface and the boundary conditions describing molecular-surface interactions is ascertained in terms of a semi-phenomenological theory. Experiments for measuring the dispersion parameters are described and the results are discussed and compared with theory. A theory and an experiment for determining surface accommodation coefficients using sound propagation in rarefied gas are outlined. Finally a theoretical model is constructed that leads to a reasonable qualitative and quantitative description of sound propagation in rarefied gases. (Author)

AD-608 635 Div. 25
OTS Prices: HC $2.00/MF $0.50

Raytheon Co., Waltham, Mass.
GASEOUS LASER RESEARCH.
Interim engineering rept. no. 2, 1 Aug-31 Oct 64,
by F. Horrigan, S. Koozekanani, and R. Tataronis.
31 Oct 64, 48p Ray-S-705
Contract AF33 615 1949, Proj. 4156, Task 415608
Unclassified report

Descriptors: (*Lasers, Excitation), (*Helium, Lasers), (*Xenon, Lasers), Neon, Atomic energy levels, Electron transitions, Electron beams, Focusing, Plasma medium, Stability, Probes (Electromagnetic).

The objective of the research effort is to achieve detailed understanding of the excitation mechanisms operative in the xenon and helium-xenon gas lasers. The Bates-Damgaard lifetime estimates were extended to include eleven different sets of xenon levels as well as four sets of neon levels. The upper laser levels in xenon (i.e. the 5d levels) are predicted to have extraordinarily long lifetimes. Eighteen known helium cross-sections and the two presently available for xenon, were carefully examined and certain general properties noted. Combining the results of the lifetime and cross-section considerations, a general explanation for the properties of a discharge-excited laser system was developed. Instabilities in the plasma observed during the course of Langmuir probe studies were identified with running striations. The 'clean-up' of xenon has been studied. Short term stability with respect to the xenon pressure was obtained by deliberately 'saturating' the walls with xenon.

AD-608 654 Div. 25,13
OTS Prices: HC $2.00/MF $0.50

Aerospace Corp.,Los Angeles, Calif.
ON THE FREE VIBRATION OF A THIN-WALLED CYLINDRICAL SHELL SUBJECTED TO A BENDING MOMENT,
by V. I. Weingarten. 10 Nov 64, 31p
TDR-269(4560-40)-4
Contract AF04 695 269
SSD TDR64 155
Unclassified report

Descriptors: (*Structural shells, Vibration), (*Cylindrical bodies, Structural shells), Deformation, Moments, Loading (Mechanics), Buckling (Mechanics).

The effect of a bending moment on the free vibrations of a thin-walled cylindrical shell is investigated by means of a modified Donnell equation. An experimental investigation was performed in conjunction with the analysis. The results indicate that as the bending moment increases some frequency curves increase in magnitude while others decrease which is contrary to results obtained for symmetric loadings. (Author)

AD-608 664 Div. 25, 17
OTS Prices: HC $3.00/MF $0.75

South Dakota School of Mines and Technology, Rapid City.
THE THERMAL CONDUCTIVITY AND SEEBECK EFFECT OF IMPURE INDIUM ANTIMONIDE IN A

MAGNETIC FIELD.
Technical rept. no. 13,
by Eldon F. Ault. 1 Nov 64, 56p
Contract Nonr2964 01, Proj. NR017 208
Unclassified report

Master's thesis.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Antimony alloys, Thermal conductivity), (*Thermal conductivity, Antimony alloys), (*Thermoelectricity, Antimony alloys), Indium alloys, Impurities, Tellurium, Single crystals, Measurement, Magnetic fields, Magnetic properties, Electrical conductance, Semiconductors.

A study was made of the thermal conductivity and Seebeck coefficient of a single crystal of InSb containing 3.3(10) to the 18th power tellurium atoms per cubic cm. Measurements were made in the temperature range of 338K to 648K and at magnetic fields between 1000 and 8000 Gauss. The electrical conductivity had a value of 5700/(Ohm-cm) at 358K. The thermal conductivity, determined by the series comparison method with Inconel 702 as standards, decreased from 0.14 W/cmK at 338K to 0.091 W/cm-K at 648K. The Wiedemann-Franz ratio was used to determine the electronic component of the thermal conductivity from measured values of the electrical conductivity and amounted to 79% of the total thermal conductivity at 613K. The difference between the total thermal conductivity and the electronic component was attributed to conduction by the lattice. The lattice thermal resistance was approximately twice that of pure InSb. The Seebeck coefficient varied from -15 microvolts/K at 338K to -109 microvolts/K at 613K with the low-temperature values being less negative than theoretically predicted. (Author)

AD-608 670 Div. 25, 6
OTS Prices: HC $1.00/MF $0.50

Brown Engineering Co., Inc., Huntsville, Ala.
OBSERVATION OF STATISTICAL FLUCTUATIONS IN OPTICAL SECOND HARMONIC GENERATION,
by J. William Foreman, Jr. Nov 64, 22p
BrownEng-R-121
Unclassified report

Descriptors: (*Beams (Electromagnetic), Lasers), (*Lasers, Stochastic processes), (*Optical phenomena, Measurement), Time-lag theory, Probes (Electromagnetic), Harmonic analysis, Frequency multipliers, Ruby, Potassium compounds, Phosphates, Crystals, Harmonic oscillators.

Measurements of the statistical fluctuations in optical second harmonic generation have been made using both short and long time constant detector circuits. The second harmonic was generated by focusing the beam from a standard ruby laser (not Q-switched) on a KDP crystal mounted approximately in the phase-matched orientation. As expected, the measured fluctuations were smaller in the long time constant case. A steady decrease in second harmonic output was observed throughout the measurements. Some possible reasons for this anomalous effect are discussed. (Author)

AD-608 672 Div. 25
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
PHYSICS OF THE SOLID STATE.
Final rept.,
by Robert J. Maurer. Nov 64, 9p
Contract Nonr1834 19, Proj. NR017 412
Unclassified report

Descriptors: (*Solid state physics, Crystal lattices), (*Alkali metal compounds, Halides), (*Color centers, Spectroscopy), Ions, Diffusion, Crystal lattice defects, Dielectric properties, X-ray spectrum, Absorption spectrum, Atomic energy levels, Ultraviolet radiation, Photons, Impurities, Zone melting.

The work of the program developed around two themes: (1) Ionic Mobility in the Alkali Halides, and (2) Color Centers in the Alkali Halides. The most significant results obtained on ionic mobility were the evidence for a contribution of vacancy pairs to the self-diffusion coefficient of the chloride ion in sodium chloride and the evidence for a high-temperature, high-frequency dielectric loss due to vacancy pairs in the alkali halides. Although much detailed information was obtained concerning the interaction and relationships of H, V, F, and a color centers in the alkali halides, the most important contributions were (1) the evidence that the H optical absorption band formed by x-rays at low temperatures is composed of overlapping bands due to H and V sub K centers and the determination of the position and shape of the band due to H centers, and (2) the evidence that interstitial particles (H centers or interstitial halogen atoms) can be formed by low energy, ultraviolet photons in crystals containing the hydroxyl ion as an impurity. (Author)

AD-608 673 Div. 25
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
PHYSICS OF THE SOLID STATE.
Technical rept. no. 8,
by Robert J. Maurer. Sep 64, 19p
Contract Nonr1834 19, Proj. NR017 412
Unclassified report

Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Solid state physics, Crystals), (*Potassium compounds, Chlorides), (*Crystals, Impurities), Mass spectroscopy, Standards, Purification, Zone melting, Bromine, Separation.

A mass spectrographic technique for the impurity analysis of potassium chloride by the high frequency spark source was evaluated. The technique proved to be successful but rather tedious. Because of the low ionization potential of K, the usual assumption of equal sensitivity for analysis of all elements is dubious and further work using internal standards is necessary. Zone refining of KCl significantly reduces the concentrations of the impurities Na, Mg, Al, Si, S, Br, and Rb. The elimination of bromine by bubbling chlorine through the molten salt is very successful.

AD-608 682 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Uppsala Univ. (Sweden).
CHEMICAL SUBSTITUTION TREATED BY PARTITIONING IN THE HUCKEL APPROXIMATION.
Scientific rept. no. 19,
by John E. Harriman. 15 Jun 64, 26p
Contract AF61 052 701
ARL 65 5
Unclassified report

Preprint no. 124.
Legibility of this document is in part unsatisfactory.

Reproduction has been made from best available copy.

Descriptors: (*Atomic energy levels, Atomic orbitals), (*Substitution reactions, Molecular properties), (*Molecular properties, Substitution reactions), Aromatic compounds, Perturbation theory, Hamiltonian, Electrons, Combinatorial analysis, Physical chemistry, Graphics, Numerical methods and procedures, Matrix algebra.

A scheme is presented for the discussion of the effects of chemical substitution on one-electron energies and LCAO molecular orbitals in the simple Huckel approximation. The method is based upon the partitioning of the Hamiltonian matrix corresponding to the physical division of the system into molecule and substituent interacting through one bond. Graphical methods are developed and a series of hypothetical substituted benzenes are considered as examples. (Author)

AD-608 713 Div. 25
OTS Prices: HC $1.00/MF $0.50

Rutgers Univ., New Brunswick, N. J.
TIME DEPENDENCE OF THE ORDER PARAMETER OF A SUPERCONDUCTOR NEAR THE TRANSITION TEMPERATURE.
Technical rept.,
by Toshihiko Tsuneto and Elihu Abrahams.
23 Nov 64, 7p
Contract Nonr40413, Proj. NR018 104
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Superconductors, Theory), Magnetic fields, Transition temperature, Time, Quantum mechanics, Quantum statistics, Fermions, Potential theory, Green's function.

An equation is derived that describes how interelectronic interactions determine the time variation of one specific order parameter in a pure superconductor. The equation is derived from the equations of motion obeyed by the (non-equilibrium) one particle Green's function in the presence of time dependent fields and interactions. These are related to the findings of L. P. Gor'kov (Sov. Phys. JETP, 7:505 (1958), 9:1364 (1962), and 10:998 (1960).

AD-608 717 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

Army Electronics Labs., Fort Monmouth, N. J.
BEAM DIVERGENCE AND FAR-FIELD PATTERNS OF RUBIES OF VARYING OPTICAL QUALITY.
Technical rept.,
by C. M. Kellington and M. Katzman. Jul 64, 23p
Task 1P6 22001A056 03 13
USAEL ECOM2478
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Lasers, Ruby), (*Ruby, Optical properties), Crystals, Optical images, Photographic analysis, Collimators, Pumping (Electronics).

Beam divergence at 10 db from extinction was measured, and far-field patterns photographed for 37 ruby rods of different quality. The growth with pumping power of the most intense portion of the laser beam was measured for two rods of very different quality. An autocollimator reticle image was photographed after passage through each rod. Correlation of beam divergence with optical parameters is discussed. (Author)

AD-608 729 Div. 25
OTS Prices: HC $1.00/MF $0.50

Oklahoma State Univ., Stillwater. Research Foundation.
SHEAR WAVE INTERFERENCE OBSERVED BY OPTICAL BIREFRINGENCE INDUCED IN A VISCOELASTIC LIQUID.
Technical rept.,
by J. L. Schrag, J. F. Guess, and G. B. Thurston.
Nov 64, 19p
Contract Nonr259503, Proj. 385 545
Unclassified report

Descriptors: (*Mechanical waves, Interference), (*Refraction, Mechanical waves), Liquids, Viscoelasticity, Dyes, Oscillation, Propagation, Velocity, Optical phenomena.

A theoretical and experimental study of the shear wave field and the associated optical birefringence produced by interfering primary and reflected wave trains propagating in a viscoelastic medium is presented. The shear wave field is generated by two parallel planes, one oscillating sinusoidally in its own plane, the other held motionless at a fixed distance from the driving plane. The shear wave induced birefringence was analyzed by a determination of the modification of the state of polarization of incident circularly polarized light upon passage through the medium. The limiting cases of small and large separation between generating surface and reflecting surface with respect to the shear wavelengths in the medium are useful for determinations of the propagation constant and the mechano-optic constant, while intermediate values of separation of surfaces are useful for demonstrations of the character of the stationary wave patterns. Theoretical determinations of the velocity gradient distribution in the medium for various ratios of surface separation to shear wavelength are presented together with experimental determinations for an aqueous suspension of milling yellow. (Author)

AD-608 733 Div. 25, 4, 8
OTS Prices: HC $1.00/MF $0.50

Carlye Barton Lab., Johns Hopkins Univ., Baltimore, Md.
RESEARCH OF DISCRETE ENERGY LEVELS IN SYSTEMS OF ATOMS.
Final rept. for 1 Oct 63-Aug 64,
by R. L. Armstrong, J. B. Newman, and J. W. Whalen.
Nov 64, 18p WR-AF-6
Contract AF33 615 1051
AL TR64 290
Unclassified report

Descriptors: (*Atomic energy levels, Absorption spectrum), (*Nitrogen compounds, Fluorides), (*Uranyl radicals, Nitrates), Argon, Crystals, Impurities, Microwave spectroscopy, Crystal lattices, Nuclear resonance, Quadrupole moments, Chemical bonds, Vibration, Rotation, Atomic orbitals, Rubidium compounds, Spectra (Infrared), Molecular structure, Molecular electronics, Materials.

Microwave absorption spectra of nitrogen trifluoride doped argon crystals, at 4K, were taken in the 18 to 49 gc region. Using a model of the doped lattice which neglected exchange effects, absorptions greater than 3 db were estimated. With a broad-band apparatus, limited by a 1 db sensitivity, no absorption was found. A machine program was written for the calculation of the uranyl overlap integrals which yields the Belfords' values. When Hartree-Fock-Slater, instead of the Hartree, uranium solutions are used, preliminary results show the pi-overlaps are still larger than the sigma-overlaps although differences between them are less. Infrared absorption spectra of rubidium uranyl nitrate, at 4K, were taken,

which contain absorption lines characteristic of the unit cell. These results are part of a larger study, which is continuing, of the behavior of two molecular systems, doped inert gas lattices and uranyl salts. These investigations were undertaken because of the scientific problems involved and in an effort to find new useful materials for quantum electronics applications. (Author)

AD-608 739 Div. 25, 4
OTS Prices: HC $2.00/MF $0.50

Carlyle Barton Lab., Johns Hopkins Univ., Baltimore, Md.
ABSORPTION SPECTRA OF MATRIX ISOLATED NITROGEN TRIFLUORIDE FROM 18 - 50 Gc,
by R. L. Armstrong, J. B. Newman, and J. J. Whalen.
Aug 64, 33p WR-AF-5
Contract AF33 615 1051
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Nitrogen compounds, Fluorides), (*Fluorides, Absorption spectrum), Argon, Crystals, Impurities, Microwave spectroscopy, Crystal lattices, Cryogenics.

An experimental study has been made of the absorption spectrum of NF3 molecules trapped in an argon matrix in the microwave region from 18--50 Gc. A discussion of the properties of such crystals is given, followed by a description of the experimental apparatus and technique. No microwave absorption in excess of 1 db was observed, 1 db being the smallest signal which could be detected by the microwave spectrometer used in this experiment. A discussion of this result is given together with recommendations for future experiments. (Author)

AD-608 750 Div. 25, 14
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
THE EXPLOITATION OF THE STRENGTH OF 'WHISKERS,'
by George A. Hoffman. 1 Mar 58, 16p P-1294
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Fiber metallurgy, Single crystals), (*Single crystals, Tensile properties), (*Composite materials, Single crystals), Density, Elasticity, Crystal growth, Crystal lattice defects, Metals, Alloys, Carbides, Oxides, Weight, Temperature, Economics, Structural properties, Stresses.

The possibility of putting the phenomenal strength of 'whiskers' to use for structural purposes is investigated in this paper. The properties of 'whiskers' and the structural characteristics of hypothetical materials composed from them permit comparing the weights of tension structures made from whiskers with the weights of structures made from conventional materials. Reductions to one-fifth of the conventional weight appear to be feasible. (Author)

AD-608 760 Div. 25
OTS Prices: HC $1.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
THE METASTABILITY OF AMORPHOUS STRUCTURES.
Technical rept. no. 1,
by Morrel H. Cohen and David Turnbull. 25 Sep 64, 5p
Contract Nonr1866 50, Proj. NR032 485,
Unclassified report

Prepared in cooperation with the Institute for the Study of Metals, Univ. of Chicago, Ill.

Descriptors: (*Glass, Phase studies), (*Phase studies, Glass), Stability, Spheres, Density, Cryogenics.

AD-608 765 Div. 25
OTS Prices: HC $1.00/MF $0.50

Cruft Lab., Harvard Univ., Cambridge, Mass.
MAGNETO-OPTICAL EFFECTS IN FERROMAGNETIC METALS,
Scientific rept. no. 2 (Series 3),
by B. R. Cooper, H. Ehrenreich, and L. Hodges.
28 Sep 64, 21p
Contracts AF19 628 3874, SD88, Proj. 5635, Task 563503
AFCRL 64 830
Unclassified report

Descriptors: (*Ferromagnetic materials, Magneto-optic effect), (*Magneto-optic effect, Ferromagnetic materials), Metals, Paramagnetic materials, Nickel, Electron transitions, Mathematical models.

The use of the Ferromagnetic Kerr Effect (FKE) is discussed in conjunction with band calculations for paramagnetic Ni and Fermi surface measurements with a view towards developing a reasonable range of models for the band structure of ferromagnetic nickel near the Fermi energy. The use of the FKE is illustrated by determining two typical models in this range for the case of rigid splitting of the paramagnetic d band structure near the Fermi energy. The extent to which these, as well as two earlier models give reasonable results for the FKE, other experimentally measured quantities, and the d band splitting is discussed. (Author)

AD-608 772 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div of Engineering and Applied Physics.
THERMODYNAMICS AND KINETICS OF FORMATION OF THE GLASS STATE AND INITIAL DEVITRIFICATION.
Technical rept. no. 2,
by David Turnbull. 25 Sep 64, 31p
Contract Nonr186650, Proj. NR032 485
Unclassified report

Descriptors: (*Glass, Phase studies), (*Thermodynamics, Glass), Mathematical models, Surface properties, Crystalization, Crystals, Dynamics, Nucleation, Melting.

Any body which exhibits a viscosity equal to or greater than the somewhat arbitrary 10 to the 15th power poise is considered to be solid. A liquid may transform into a solid either by the discontinuous process of crystallization or by a continuous transition leading to the formation of an amorphous solid or glass. The conditions which determine which of these modes occur are surveyed. (Author)

AD-608 781 Div. 25
OTS Prices: HC $1.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.

THEORY OF CONTINUOUS ZONE REFINING VIA THE ZONE-TRANSPORT METHOD.
Physical Sciences Research Papers,
by John K. Kennedy and N. Grier Parke, III. Oct 64, 22p
Proj. 5620
AFCRL 64 844; AFCRL PSRP55

Unclassified report

Descriptors: (*Zone melting, Theory), Equations of state, Mathematical models, Meltings, Density.

This paper explains the differences and the reasons for the differences which exist between the theory of the zone-transport system of continuous zone refining as presented by W. G. Pfann and T. Abe. The identity between the mathematical model used to describe the zone-transport system and one of the models used to describe the recently reported matter-transport system is noted. Nondimensional equations for the zone-transport system are presented and the difference between the limit of alpha in the zone-void and zone-transport systems, when L sub e = 0, is correlated. (Author)

AD-608 785 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
INFRARED SPECTRA OF INORGANIC DIELECTRIC SOLIDS.
Physical Sciences Research Papers,
by Johannes N. Plendl and Peter J. Gielisse.
May 64, 28p
Proj. 5621
AFCRL 64 380; AFCRL PSRP59

Unclassified report

Descriptors: (*Spectra (Infrared), Dielectrics), (*Dielectrics, Spectra (Infrared)), Solids, Inorganic compounds, Low-temperature research, Crystal lattices, Frequency, Center of gravity, Experimental data, Molecular spectroscopy.

The lattice vibration spectrum of a solid has recently been characterized by one single frequency, which is defined as the frequency of the center of gravity of the spectrum, called 'centro-frequency.' Here the experimental determination of this frequency is shown in detail for a number of solids, the vibrational spectra of which became available recently. Emphasis is given to spectral data at various temperatures, from 4K to about 1000K, and at the various major crystallographic directions. The 'centro-frequencies' at room temperature and higher temperatures show almost no change; whereas, at low temperature the 'centro-frequencies' consistently show a very definite increase. The result reveals a definite increase in binding energy with temperature decrease. A considerably higher resolution, particularly in the broad band areas, was obtained with spectra at very low temperatures. (Author)

AD-608 794 Div. 25
OTS Prices: HC $1.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
GRAPHS OF ELECTRICAL PROPERTIES OF IONIZED MEDIA,
by C. P. Sonett. 30 Aug 57, 24p GM-TM-190
Contract AF18 600 1190

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma medium, Electrical properties), Graphics, Ionization, Attenuation. Refractive index, Dielectric properties, Admittance, Phase shift, Plasma physics.

The computations are graphed based on the assumption that the damping constant is equal to the collision frequency, Z. All of the calculations are for an isotropic medium. (Author)

AD-608 795 Div. 25
OTS Prices: HC $2.00/MF $0.50

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
NOTES ON VIBRATIONS OF THIN, PRESSURIZED CYLINDRICAL SHELLS,
by E. Reissner. 9 Nov 55, 28p AM-5-4

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Cylindrical bodies, Vibration), (*Structural shells, Vibration), Pressure vessels, Mathematical analysis, Differential equations, Determinants.

The report states the equations which govern vibrations of thin, circular cylindrical shells which are subjected to pressurization. The basic assumptions are: (1) Pressurization is of such magnitude as to eliminate wall bending as a significant stiffness element. (2) Deflections are small enough to allow use of a linearized system of equations. (3) Material of the walls is isotropic and obeys Hooke's law. On the basis of the stated system of differential equations, a solution of the vibration problem is given for an infinite shell.

AD-608 796 Div. 25, 8
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
A STUDY OF PLASMA STABILITY IN MICROWAVE CAVITIES BY A FREQUENCY-SHIFT ANALOG,
by Robert A. Swanson. 1964 , 16p
STL/TR-59-0000-00812
Contract AF04 647 309
PB 146 839

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Plasma medium, Stability), (*Microwave equipment, Plasma physics), Cavity resonators, Plasma oscillations, Frequency shift, Perturbation theory, Electromagnetic fields, Microwaves.

An equation is derived which relates the pressure change at a perturbed microwave cavity boundary to the change in resonant frequency of the cavity. The equation is used to obtain information on the stability of a plasma confined by microwave fields. (Author)

AD-608 800 Div. 25
OTS Prices: HC $1.00/MF $0.50

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
PHOTO IONIZATION RATE OF CESIUM AT LOW PRESSURES,
by A. O. Kresse. 24 Oct 61, 4p BSC-28013, FS-61TN-1011
Contract AF04 647 911

Unclassified report

Descriptors: (*Cesium, Gas ionization), (*Gas ionization, Solar radiation), Low-pressure research, Vapors, Photons, Ionization potentials, Energy, Transport properties, Mathematical analysis, Electron density, Ionization, Ionosphere, Plasma physics.

A first order rate equation is derived. The computed value indicates that at high altitudes the generation of electrons due to photo-ionization can equal or exceed the depopulation due to slow 3 body recombination. This can lead to a stable electron density which will disappear due to diffusion only.

AD-608 808 Div. 25, 9
OTS Prices: HC $3.00/MF $0.75

California Univ., Los Angeles.
EXPERIMENTS CONCERNING THE HARTMANN WHISTLE,
by Timothy J. B. Smith and Alan Powell. Sep 64, 79p UCLA-DE-64-42
Contract Nonr23362, Proj. RR009 01 01
Unclassified report

Descriptors: (*Sound generators, Experimental data), Acoustic generators, Fluid mechanics, Jets, Supersonic flow, Shock waves, Resonance, Resonators, Spark shadowgraph photography.

The Hartmann whistle, in its most basic configuration, consists of a flat-bottomed, cylindrical cavity which is axially aligned with a supersonic air jet of the same diameter. Discrete-frequency oscillations of the enclosed air column are driven at large amplitudes when the cavity is located within certain regions of the cellular structure of the jet. An optical and acoustical study of the phenomenon is described, together with that of the Hartmann 'pulsator'. In the latter form the whistle has the small cavity replaced by a large Helmholtz-type resonator with the same orifice diameter, resulting in a large-amplitude aeroacoustic oscillator with a periodic time of several orders of magnitude greater than for the regular whistle. The underlying cause of the newly discovered bistable condition of the normal 'shock-disc' located in the airstream between the nozzle and the cavity orifice is an important aspect which makes possible a (presently qualitative) theory of operation which accounts for the principal features of the Hartmann whistle and its direct derivatives. Some other aspects still requiring further elucidation and which are the subject of continuing effort are mentioned. The Report includes a brief review of the currently available literature pertaining to the phenomenon. (Author)

AD-608 826 Div. 25, 14
OTS Prices: HC $2.00/MF $0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
ELECTRONIC BAND STRUCTURE OF TiC, TiN, AND TiO,
by V. Ern and A. C. Switendick. Oct 64, 28p
LIR-TR-192
Contracts Nonr184110, AF33 616 8353, Proj. NR018 801
Unclassified report

Descriptors: (*Titanium compounds, Electron transitions), (*Electron transitions, Titanium compounds), Carbides, Nitrides, Oxides, Crystallography, Brillouin zones, Atomic energy levels, Spheres, Analysis.

The band structure of metallic face-centered cubic TiC, TiN, and TiO has been obtained by the augmented plane wave (APW) method at the equivalent of 256 points in the Brillouin zone and for an energy range appropriate to cover the nonmetal 2s and 2p and the titanium 3d and 4s states. A density of states, the Fermi energy, and contours of constant energy were obtained for the three compounds. A charge distribution in the APW scheme was derived from the equivalent of 32 points in the zone, and the admixture of the bands was analyzed. The results are consistent with the available experimental data. (Author)

AD-608 827 Div. 25, 7, 14
OTS Prices: HC $1.00/MF $0.50

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
BREAKDOWN STRENGTH OF ALKALI HALIDES AS FUNCTION OF TEMPERATURE AND DISLOCATION DENSITY,
by Rolf Nevald. Oct 64, 22p LIR-TR-193
Contracts AF33 616 8353, Nonr184110, Proj. NR018 801
Unclassified report

Descriptors: (*Single crystals, Electrical properties), (*Dielectrics, Degradation), (*Alkali metal compounds, Halides), Crystal lattice defects, Thermal properties, Sodium compounds, Fluorides, Chlorides, Rubidium compounds, Bromides, Potassium compounds, Iodides, Ionization, Ionic current.

The d-c breakdown strength of NaCl, RbBr, and KI single crystals was measured from 4.2 to 400K. The characteristics consist of a slow rise at low temperatures followed by a steep decrease in the high-temperature region. The positive slopes at low temperature conform to theoretical expectation based on the von Hippel criterion of impact ionization. The position of the maxima for the different crystals corresponds approximately to the temperaturef where the ionic current densities in the various materials are identical. The electric strength of NaCl crystals was measured as function of temperature for four different dislocation densities. Low dislocation concentrations, as found in normally prepared crystals, have no noticeable effect. For high dislocation densities, the rising section of the characteristic flattens, the falling section steepens, and the maximum shifts to lower temperatures. These trends conform with previous findings on the effect of addition agents and the transition from crystal to glass. The dislocations were found to cause a dielectric relaxation spectrum in the 10 to the 3rd to 10 to the 8th power Hz region. (Author)

AD-608 836 Div. 25, 14
OTS Prices: HC $3.00/MF $0.75

ManLabs., Inc., Cambridge, Mass.
THERMODYNAMICS OF INTERSTITIAL SOLID SOLUTIONS AND REFRACTORY COMPOUNDS.
Rept. for Sep 63-Sep 64,
by Harold Bernstein and Larry Kaufman. Oct 64, 74p
Contract AF33 657 9826, Proj. 7350, Task 735001
ASD TR61 445 P4
Unclassified report

Descriptors: (*Refractory materials, Thermodynamics), (*Thermodynamics, Refractory materials), Solid solutions, Refractory metals, Carbides, Nitrides, Oxides, Vaporization, Kinetic theory, Transport properties, Phase studies, Tantalum compounds, Niobium compounds, Impurities, Mathematical models, Equations of state.

The vaporization kinetics of a non-stoichiometric solid phase such as NbC has been analyzed on the basis of a Schottky-Wagner vacancy model of the solid, Langmuir vaporization rates of the elements, and non-diffusion limited mass transport. The time dependence of the instantaneous composition, weight, and vaporization rate

for a specimen of constant area has been calculated for the conditions of a Langmuir vaporization experiment. Congruent and non-congruent vaporization are controlled by the magnitude of the congruent composition, which can be calculated from equilibrium thermodynamic data. The parameters required to specify the vaporization behavior are starting composition, stoichiometric composition, vapor pressures and molecular weights of the pure elements, temperature dependence of the phase boundaries, free energy of formation of the stoichiometric compound, and specimen geometry. The phases NbC and TaC are treated as examples of congruently and non-congruently vaporizing systems. The predicted vaporization behavior of these materials agrees well with the data from Langmuir vaporization experiments available in the literature. (Author)

AD-608 845 Div. 25
OTS Prices: HC $5.00/MF $1.00

ITT Federal Labs., Nutley, N. J.
RESEARCH ON SEMICONDUCTING DIAMONDS.
Final rept. for Oct 61-Sep 64,
by G. R. Leef, D. C. Seeley, and H. G. Nordlin. Sep 64, 154p ITT-TD-64-780
Contract AF19 628 225, Proj. 4608, Task 460805
AFCRL 64 820

Unclassified report

Rept. includes Appendix A, A Review of Literature Pertaining to Semiconducting Diamond.
See also AD 417 627.

Descriptors: (*Diamonds, Semiconductors), (*Semiconductors, Diamonds), Resistance (Electrical), Hall effect, Life expectancy, Magnetic properties, Crystal structure, Heat of activation, Impurities, Measurement, Electroluminescence, Reviews.

Research was performed to determine the inherent phenomena causing semiconductivity in diamonds, with special consideration for the rare natural type II-b material. In this work, resistivity and Hall coefficient have been carefully measured on several type II-b samples over the temperature range of 100K to 900K. The apparatus developed for these measurements is described. From these measurements, the activation energy of the principal acceptor level was determined for each specimen, and concentrations of donors and acceptors were deduced by a graphical method. The magnetoresistance and coefficient of magnetoresistance for one specimen in two orientations and at two temperatures are presented. Optical and electrical evidence of a polysynthetic twin structure is presented and discussed. (Author)

AD-608 853 Div. 25, 15
OTS Prices: HC $2.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
OUTGOING SOLUTIONS OF THE WAVE EQUATION WITH POTENTIAL,
by D. Thoe. Nov 64, 26p MRC-TSR-525
Contract DA11 022ORD2059

Unclassified report

Descriptors: (*Quantum mechanics, Functional analysis), (*Partial differential equations, Quantum mechanics), Operators (Mathematics), Transformations (Mathematics), Field theory, Equations, Scattering, Energy, Integration, Potential theory, Perturbation theory.

The existence of finite-energy solutions of the potentially-perturbed wave equation is proved. The proof relates the time-dependent scattering theory for the wave equation to the quantum mechanical scattering theory. (Author)

AD-608 867 Div. 25
OTS Prices: HC $2.00/MF $0.50

Bendix Corp., Southfield, Mich.
DETERMINATION OF CHEMICAL SPECIES PREVALENT IN A PLASMA JET.
Rept. for 1 Mar 63-29 Feb 64,
by G. J. O'Halloran and L. W. Walker. Nov 64, 36p
Contracts AF33 657 11018, AF33 616 8374,
Proj. 7360, Task 736001
ASD TDR62 644 P2

Unclassified report

Descriptors: (*Plasma jets, Mass spectroscopy), Analysis, Supersonic flow, Carbon dioxide, Ionization, Sampling, Feasibility studies, Chemical properties, Physical properties, Plasma medium, Ions, High-temperature research, Determination.

A modified time-of-flight mass spectrometer, equipped with a specially designed inlet system, was used to conduct investigations of an arc plasma jet exhausting into the atmosphere to provide a better understanding of the chemical and physical processes occurring in this type of extreme thermal environment. Various aspects of the interaction between the inlet probe and an atmospheric pressure plasma sample were clarified. Probable velocity distribution perturbations were observed, and changes in sample concentrations as a result of species separations occurring during the supersonic expansion were observed and correlated. Additional species identifications and measurements were performed. In particular, neutral 44CO2 was detected, and its concentration in the plasma sample was determined. Detection sensitivities for neutral species present in the input gas-plasma flow down to the 0.01 percent level were demonstrated. Detailed information describing the differences between those mechanisms governing the entrainment, mixing, and ionization of species from the atmosphere and those governing the distribution and ionization of species injected directly into the arc chamber was derived. In addition, the repeatability of the complete system was determined. (Author)

26. Production and Management

AD-608 483 Div. 26, 22
OTS Prices: HC $2.00/MF $0.50

Army Frankford Arsenal, Philadelphia, Pa.
A GRAPHIC TECHNIQUE APPLIED TO THE ANALYSIS OF THE TORQUE FLUCTUATIONS OF A SPEED INCREASING GEAR TRAIN,
by V. A. Rogers and R. A. Shaffer. Jun 64, 31p
AFA M64 28 1

Unclassified report

Descriptors: (*Gears, Torque, (*Timing devices, Gears), Time-delay fuzes, Drives, Effectiveness, Oscillation, Graphics.

Assuming a constant value for the coefficient of friction between mating teeth, the effects of tooth geometry on the torque fluctuations of a spur gear mesh are analyzed. A graphic method is presented and used to determine the composite efficiency curves of three, five mesh gear trains. Based on the information generated, several conclusions are reached regarding the application of gears of both clock and involute tooth forms to speed increasing drives. (Author)

AD-608 486 Div. 26, 3, 8
OTS Prices: HC $3.00/MF $0.50

National Berryllia Corp., Haskell, N. J.
FABRICATION OF BERYLLIUM OXIDE RADOMES BY PYROLYTIC DEPOSITION.
Final engineering rept. for 8 Feb 63-30 Jun 64,
by George Ferment. 30 Jun 64, 49p
Contract NOw63 0412c

Unclassified report

Descriptors: (*Beryllium, Radomes), (*Vapor plating, Beryllium), (*Radomes, Manufacturing methods), Water vapor, Aluminum, Oxides, Refractory coatings, Pyrolysis, Halides, Chlorination, Foams, Thermodynamics, Processing, Chemical reactions, Industrial research.

Research and development work has been conducted with the objective of producing refractory oxide coatings by pyrolytic deposition processes. Beryllium oxide, because of its outstanding physical properties, such as high melting point, high thermal conductivity, low density and electrical characteristics is a strong contender for advanced structural applications. The program was therefore directed toward the preparation of the pyrolytic form of this compound. A hydro-pyrolytic reaction involving thermal decomposition of beryllium compounds produced in the vapor phase from volatile beryllium halides and oxygen donors such as water vapor was selected for detailed stu. The parameters of the dependent and independent variables were partially established and consequently pyrolytic coatings of limited thickness only were produced. The investigation therefore not only demonstrated that pyrolytic beryllium oxide can be prepared but also that continued research is necessary in order to define the controls which must be observed in order to produce the compound in massive form. (Author)

AD-608 497 Div. 26, 17
OTS Prices: HC $4.00/MF $1.00

Nuclear Metals, Inc., Concord, Mass.
DEVELOPMENT OF DIES FOR EXTRUSION OF COMPLEX SHAPES OF STEEL AND REFRACTORY ALLOYS.
Final rept. for Jul 62-30 Jun 64,
by J. G. Hunt, J. L. Klein, and J. M. Siergiej.
25 Nov 64, 133p NMI-9700.24
Contract AF33 657 8798, Proj. 7 946
ML TDR64 295

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.
See also AD-405 135.

Descriptors: (*Dies, Extrusion), (*Steel, Extrusion), (*Refractory metal alloys, Extrusion), (*Ceramic materials, Dies), Refractory materials, Zirconium compounds, Dioxides, Titanium compounds, Carbides, Ceramic coatings, Aluminum compounds, Oxides, Tool steel, Molybdenum alloys, Titanium alloys, Zirconium alloys.

The utility of massive ceramic dies for the precision high temperature extrusion of complex shapes of refractory metal alloys has been demonstrated. Precision extrusion of shaped structural steels through ceramic coated dies was gained by refinement and close control of extrusion parameters. Refractory ceramics of high compression strength like ZrO2 or TiC were found capable of extruding TZM molybdenum alloy at 3700F and 75 tsi producing 2.0 by 1.3 by 0.250 inch Tee sections in lengths up to at least fourteen feet with dimensional runout of less than three mils and surface smoothness of 63 rms. Ceramic coated dies, like Al203 coated tool steel, were found capable of extruding 4340 alloy steel at 2300F and about 50 tsi, producing 2.0 by 1.5 by 0.062 inch Tee sections in lengths up to at least forty feet with dimensional runout of less than four mils and surface smoothness of 125 rms. The performance of massive ceramic dies in TZM extrusion indicates that massive ceramic dies would produce steel extrusions superior to those obtained with ceramic coated steel dies. (Author)

AD-608 519 Div. 26, 9, 27
OTS Prices: HC $3.00/MF $0.75

Union Coll., Schenectady, N. Y.
SOME APPLICATIONS OF JOURNAL BEARING GREEN'S FUNCTIONS,
by Joseph Modrey. Nov 64, 54p
Grant Nonr G00012 63, Proj. NR062 308

Unclassified report

Descriptors: (*Journal bearings, Green's function), (*Green's function, Journal bearings), (*Lubrication, Theory), Gas bearings, Lubricants, Hydrostatics, Hydrodynamics, Loading (Mechanics), Integrals, Integration.

The fundamental Green's Function for journal bearings are applied to both externally pressurized bearings and self-acting bearings. The Green's Function solution agrees very well with the theoretical solution of a self-acting bearing with Sommerfeld conditions. Small discrepancies between the Green's Function solution and experimental hydrostatic bearing data exist at the higher eccentricities. Differences arise from errors in estimating orifice discharge coefficients, neglect of local turbulent conditions in the Green's Function solution and tolerances in the real clearances of experimental models. All three of these factors seem equally important in an error analysis, hence the accuracy of Green's Function solutions is compatible with the realities one must recognize in applying the theory of lubrication. (Author)

AD-608 556 Div. 26, 8
OTS Prices: HC $3.00/MF $0.75

Hamilton Standard Div., United Aircraft Corp.,

Windsor Locks, Conn.
ELECTRON BEAM TECHNIQUES FOR FABRICATION AND ASSEMBLY OF PARTS FOR ELECTRON TUBES.
Quarterly rept. no. 4, 1 Apr-30 Jun 64,
by John F. Dudenhoefer. 30 Jun 64, 55p EBR-149
Contract DA36 039AMC03625E

Unclassified report

Descriptors: (*Machining, Electron beams), (*Welding, Electron beams), (*Electron beams, Manufacturing methods), Electron tubes, Electron tube parts, Joining, Tests, Acceptability.

The objectives of the program are outlined. Installation and performance of the production electron beam welding facility at the tube manufacturer's plant are presented. Fabrication and testing of the engineering sample tubes are discussed. (Author)

AD-608 572 Div. 26, 23, 30, 32
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
TIME-SHARING AND USER-ORIENTED COMPUTER SYSTEMS: SOME IMPLICATIONS FOR PUBLIC ADMINISTRATORS.
Scientific rept.,
by Herbert H. Isaacs. 30 Sep 64, 10p SP-1772

Unclassified report

Presented during a panel discussion at the 1964 National Conference of the American Society for Public Administration on 17 Apr 64.

Descriptors: (*Information retrieval, Management engineering), (*Management engineering, Information retrieval), Digital computers, Data processins systems, Programming (Computers), Operations research, Government employees, Police.

The material contained in this paper was presented during a panel discussion at the 1964 National Conference of the American Society for Public Administration on April 17, 1964. This written version is to be published in the proceedings of that conference. It contains a brief summary of some new advancements in computer system technology and their implications for public administration. The new techniques are described in terms of how they relate to three basic categories of information processing tasks. An example of one advanced application in the Los Angeles Police Department is then given. The paper concludes with a discussion of some broad implications for the public administrator. (Author)

AD-608 637 Div. 26
OTS Prices: HC $4.00/MF $1.00

Defense Metals Information Center, Columbus, Ohio.
METAL DEFORMATION PROCESSING, VOLUME I. A SURVEY CONDUCTED AS PART OF THE METAL-WORKING PROCESS AND EQUIPMENT PROGRAM (MPEP),
by F. W. Boulger, W. M. Baldwin, Jr., A. H. Clauer, J. A. Houck, and M. J. Klein. 14 Aug 64, 134p
DMIC-208
Contract AF33 615 1121, Proj. 8975

Unclassified report

Descriptors: (*Material forming, Metals), (*Metals, Material forming), Extrusion, Forging, Refractory metals, Refractory metal alloys, Rolling (Metallurgy), Crystal structure, Anisotropy, Tensile properties, Ductility, Deformation, Aging (Materials), Strain (Mechanics), Steel, Mechanical properties, Lubrication, Impurities, Hardening, Thermal properties, Heat treatment, Mechanical working.

As part of the Metalworking Process and Equipment Program, a survey was conducted to collect and summarize information on deformation characteristics of metals and their effect on processing operations. This report presents information obtained from reports on Government-sponsored work and from articles in technical publications. The report covers eight subjects: extrusion, forging, rolling, thermal mechanical variables affecting the properties of refractory metals and alloys, development of preferred orientations, anisotropy of strength and ductility, high-strain-rate deformation, and strain aging. In order to be useful to engineering students and production engineers the topics are treated in two ways. Generalized discussions of common processes point out why specific variables must be modified in order to deform certain types of metals satisfactorily. When practical, data on the more-difficult-to-form metals are used to illustrate the principles, limitations, and effects of the processes. The objective is to help the non-specialist recognize the implications of specific findings and to apply them to specific operations. (Author)

AD-608 665 Div. 26, 17, 27
OTS Prices: HC $6.00/MF $1.75

ARDE-Portland, Inc., Paramus, N. J.
DEVELOPMENT AND FABRICATION OF HIGH STRENGTH SIMULATED ROCKET MOTOR CASES BY CRYOGENIC STRETCH FORMING PROCESS.
Final rept.,
31 Oct 64, 339p
Contract AF33 657 9638

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stainless steel, Stretch forming), (*Rocket cases, Stretch forming), (*Stretch forming, Rocket cases), (*Cryogenics, Stretch forming), Aging (Materials), Welds, Strain (Mechanics), Models (Simulations), Tensile properties, Manufacturing methods, Tests, Fracture (Mechanics), Design, Toughness, Rolling (Metallurgy), Thickness.

The ARDEFORM cryogenic stretch forming process is shown to be a practical and valuable means for the fabrication of large diameter rocket motor cases. The cryogenic stretch forming process provides for: Incorporation of elliptical head shapes without the usual limitation associated with equipment size; Fabrication is accomplished by relatively simple processing; High strengths can be achieved with readily available materials. Current limitations of the cryogenic stretch forming process are associated with the application of previously determined processes to the fabrication of details for large diameter devices. Limiting areas include: Determination of detailed designs commensurate with current material forming techniques; Refinement of techniques for applying satisfactory weld beads in thick-walled vessels. (Author)

AD-608 732 Div. 26, 15, 30
OTS Prices: HC $3.00/MF $0.75

Stanford Univ., Calif.
ON SAMPLED DATA FEEDBACK CONTROL.
Technical rept. no. 100,
by Yukio Suzuki. 15 Oct 64, 54p
Contract Nonr225 52, Proj. NR342 022

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Manufacturing methods, Control), (*Quality control, Manufacturing methods), (*Optimization, Control systems), Feedback, Mathematical models, Stochastic processes, Statistical functions, Performance (Engineering).

In this paper, special types of random functions are considered as the output of the manufacturing process without control. These outputs characterize the manufacturing processes to be controlled. The observation of output is restricted to a systematic sampling and the observed values are fed back to control the manufacturing process. Also, the dead time between the observation and the corresponding reaction of control is taken into account. Three types of control procedure, the proportional control, the integral control and a mixture of both are discussed.

AD-608 735 Div. 26, 30
OTS Prices: HC $2.00/MF $0.50

Forest Products Lab., Madison, Wis.
FPL DYNAMIC COMPRESSION TESTING EQUIPMENT FOR TESTING PACKAGE CUSHIONING MATERIALS,
Research note,
by R. K. Stern. Nov 64, 27p
FPL 067; FPL 2120 rev.
Unclassified report

Revision of rept. issued in 1958.

Descriptors: (*Packing materials, Test equipment), (*Test equipment, Packing materials), Vibration isolators, Drop testing, Simulation, Dynamics, Tests, Stresses, Shock (Mechanics), Electronic recording systems, Design, Loading (Mechanics).

A dynamic compression testing system, consisting essentially of a pendulum, abutment, and electronic recording equipment, was built by the Laboratory for testing package cushioning materials. The tests simulate the loading of an item in a cushioned package when the package is impacted. The characteristics, limitations, and theoretical aspects of each component of the instrumentation are presented in detail, particularly in regard to acceleration measurements. The recording equipment is also suitable for measurements of dynamic loads and strains. (Author)

AD-608 783 Div. 26
OTS Prices: HC $2.00/MF $0.50

Air Force Cambridge Research Labs., Bedford, Mass.
HIGH PRESSURE THRUST BEARINGS: AN APPLICATION.
Instrumentation Papers,
by R. E. Riecker and D. L. Pendleton. Nov 64, 32p
Proj. 8652
AFCRL 64 883; AFCRL IP52
Unclassified report

Descriptors: (*Thrust bearings, High pressure research), (*Helocarbon plastics, Lubrication), Presses (Machinery), Molybdenum, Sulfides, Friction, Shear stresses, Torque.

Successful operation of a 50 kb-1000C rock deformation shear press depends on frictionless operation of two thrust bearings; an upper bearing must transmit undiminished 30,000 inch-pounds of torque to a mineral test specimen, and the lower bearing must permit free rotation of a torque measuring arm under maximum torques of 7000 inch-pounds. Upper bearing friction coefficients as low as 0.01 result when colloidal bonded films containing 65 percent pure MoS2 in an alkyd resin are used with MoS2 greases. The torque arm bearing is lubricated with 0.01 inch thick Teflon sheet to obtain friction coefficients below 0.016. Bearing pressures occasionally exceed 100,000 psi in both bearings, however no evidence of galling, seizing or wear have developed on any thrust plate. Torque losses do not exceed 5 percent of the transmitted value in the upper bearing and 3.5 percent in the lower bearing. (Author)

AD-608 818 Div. 26
OTS Prices: HC $6.00/MF $1.50

Universal-Cyclops Steel Corp., Bridgeville, Pa.
WELDING OF REFRACTORY METALS.
Final rept. for 28 Sep 62-30 Apr 64,
by L. M. Bianchi, W. A. McNeish, and F. D. Seaman.
Jul 64, 242p
Contract NOw263 0043c
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Welding, Refractory metal alloys), (*Refractory metal alloys, Welding), (*Refractory metals, Weldings), Welds, Welding rods, Controlled atmospheres, Vacuum, Sheets, Molybdenum alloys, Niobium alloys, Tantalum alloys, Tungsten alloys, Vanadium alloys, Zirconium alloys, Titanium alloys, Carbon alloys, Microstructure, Tungsten, Molybdenum, Stainless steel, Aluminum alloys, Corrosion, Transition temperature, Oxygen, Nitrogen.

This report presents a study of the effects of welding variables on refractory metals and indicates the degree and magnitude of control of the variables necessary for the improvement of production welds in refractory metals. The flexibility of InFab as a large inert atmosphere chamber suitable for welding refractory metals was evaluated. The ability of a welder to accomplish out-of-position manual welds in InFab was demonstrated. A limited investigation indicated improved resistance welds may be produced by inert atmosphere protection. (Author)

AD-608 858 Div. 26
OTS Prices: HC $2.00/MF $0.50

Mathematics Research Center, Univ. of Wisconsin, Madison.
A DYNAMIC INVENTORY SYSTEM,
by William G. Howe. Jul 64, 28p MRC-TSR-500
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Inventory control, Servomechanisms), Distribution (Economics), Management control systems, Feedback, Data processing systems, Operations research, Optimization, Numerical analysis, Decision theory.

A truly dynamic system is one which will adjust to changes in the parameters of the system. In the case of an inventory control procedure these parameters determine the frequency distributions of demand and of lead time. Optimization approaches assume them given along with run-out costs, inventory carrying costs and so forth. The parameters, the costs and some decision rule combine to give an equation representing total cost which is then minimized with respect to the decision rule. There are two difficulties with this approach; first, changes in the parameters do occur which invalidate the results; and

secondly, it is very difficult indeed to determine the costs in the model. The proposed servo-system attempts to avoid these two difficulties by not fixing any parameters (distributions) and by omitting any costs in the model, only employing some level of protection against run-out. (Author)

AD-608 891 Div. 26, 17
OTS Prices: HC $7.00/MF $1.75

Norair Div., Northrop Corp., Hawthorne, Calif.
DEVELOPMENT OF IMPROVED METHODS, PROCESSES, AND TECHNIQUES FOR PRODUCING STEEL EXTRUSIONS.
Final rept. for Apr 58-Mar 64,
by L. M. Christensen. Jul 64, 339p NOR-64-68
Contract AF33 600 36713, Proj. 572
ML TDR64 231

Unclassified report

Descriptors: (*Material forming, Steel), (*Extrusion, Steel), (*Steel, Extrusion), Stainless steel, Cobalt alloys, Drawing (Machine processing), Dies, Lubricants, Molybdenum alloys, Thickness, Metal-forming presses, Chromium alloys, Temperature, Hardening, Martensite, Furnaces, Tool steel, Microstructure, Surface properties, Sheets, Nickel alloys, Titanium alloys, Silicon alloys, Vanadium alloys, Maganese alloys.

A repetitively producible extruding process has been established for 0.060 inch constant thickness tee sections in high strength steel alloys. With good metallurgical control, warm drawing techniques will further reduce the section to 0.040 inch thickness at ± 0.003 inch tolerance and an excellent surface finish. However, a differential in extruded sectional thickness in this range complicates metal flow and lubrication considerably. The primary facets controlling success were, in probable order of importance, billet temperature, container temperature, die life, and lubrication. In the case of PH15-7Mo, the key to obtaining crack-free shapes was to maintain a container temperature in the range of 900F. Warm drawing was very beneficial in reducing work hardening and draw load. The means of providing preheat to the section to be drawn left considerable to be desired in that a rather large fluctuation in temperature over the length of the shape was invariably encountered. This was true with the automatically controlled induction heater first utilized and with the resistance heated tubular furnace replacement. The latter functioned dependably, but its fluctuation prevented the use of lubricants with a narrow viscosity range.

AD-608 909 Div. 26, 12
OTS Prices: HC $1.00/MF $0.50

Martin Marietta Corp., Denver, Colo.
TACK WELDING 2014-T6 AND 6061-T6 ALUMINUM ALLOY BRACKETS TO 2014-T6 ALUMINUM ALLOY SHEET,
by K. R. Agricola. Oct 57, 13p WDD-M-MI-57-80
Contract AF04 645 56

Unclassified report

Descriptors: (*Guided missiles components, Welding), (*Aluminum alloys, Spot welding), (*Spot welding, Aluminum alloys), Materials, Tests, Stresses, Tensile properties, Experimental data, Air Force, Guided missiles (Surface-to-surface), Sheets, Mounting brackets.

This is one in a series of reports on Materials, Producibility, and Structural Evaluation reports on tests of construction materials and fabrication methods for the TITAN. The tack welding analysis was requested by the Airframe Department and performed under Contract Item No. 3.

27. Propulsion Systems

AD-608 534 Div. 27
OTS Prices: HC $1.00/MF $0.50

Pyrogenics, Inc., Woodside, N. Y.
DEVELOPMENT AND DEMONSTRATION OF NOZZLES USING BULK PYROLYTIC GRAPHITE.
Interim progress rept. no. 1, 1 Jul-30 Sep 64.
30 Sep 64, 14p
Contract AF04 611 9903

Unclassified report

Descriptors: (*Pyrolytic graphite, Rocket motor nozzles), (*Rocket motor nozzles, Pyrolytic graphite), Nozzle inserts, Nozzle gas flow, Heat transfer, Temperature, Thermal expansion, Stresses, Erosion, Design, Theory, Performance (Engineering), Rocket motors (Solid propellant), Tests, Weight.

This report is a summary of the first three months of effort on the development of nozzles using bulk pyrolytic graphite. The first 1.120 inch nozzle has been designed and component parts will be fabricated during the next period. The first unit utilizes a plane oriented insulating pyroid insert and was selected from four variations of this approach. Preliminary heat transfer, temperature profile, stress and erosion calculations have been performed for the initial design and these calculations will be used in conjunction with test firing results to design the larger 2.3 inch demonstration nozzles. Design of the second development nozzle has been initiated and is partially completed. This unit utilizes partial edge oriented approach to compare performance with the plain oriented unit.

AD-608 537 Div. 27, 25
OTS Prices: HC $2.00/MF $0.50

Redstone Scientific Information Center, Redstone Arsenal, Ala.
STUDIES ON CONTACT HEAT EXCHANGE BETWEEN HEAT ENGINE PARTS,
by I. T. Shvets, E. F. Dyban, and N. M. Kondak.
3 Nov 64, 47p
RSIC 322; TT 65 60134

Unclassified report

Trans. of Akademiya Nauk URSR, Kiev. Instytut Teploenergetyky. Sbornik Trudov, 1955, v. 12, p. 21-53.

Descriptors: (*Heat transfer, Heat engines), (*Heat engines, Heat transfer), Metals, Thermal radiation, Compressive properties, Experimental data, Engines and motors, USSR.

The following problems were studied: (a) Determination of the heat transmission factor at a contact compression of metals widely used in practice; (b) Substantiation of the hypothesis of the physical nature of the mechanism of the heat exchange at contact; and (c) Ways of practical variation of the amount of heat resistance during the contact of metals.

AD-608 619 Div. 27, 12
OTS Prices: HC $4.00/MF $0.75

TRW Space Technology Labs., Redondo Beach, Calif.
DESIGN OF A MODULAR SOURCE CONTACT ION ENGINE.
Final rept. for 15 Mar 63-30 Jun 64,
by S. G. Forbes and J. C. Beynon. Nov 64, 111p
STL-8417-6018-RU-000
Contract AF33 657 10788, Proj. 3141, Task 314102
APL TR64 126

Unclassified report

Descriptors: (*Ion engines, Modular space construction), Electric propulsion, Rocket motors, Ion sources, Thrust, Engine structures, Erosion, Life expectancy, Performance (Engineering), Design, Specifications, Construction.

This report covers the design, fabrication and test of a two module engine capable of 20 mlb. of thrust with a grid replacement mechanism. Also included are analyses which calculate the grid erosion rate due to charge exchange ionization, and rocket efficiency penalties associated with high engine weight and off-optimum I sub s design. With the emitter material available for this work representative operational characteristics were: at 4600 sec. I sub s, 62% electrical efficiency and 163 KW/lb.; at 6950 sec. I, 80% electrical efficiency and 190 KW/lb. Propellant utilization was 0.94s or greater. The grid replacement weight is equivalent to a propellant utilization of not less than 90%. Engine weight is 1 Kg/ampere of ion beam. Emitter material currently developed should permit operation with this same engine at 80% electrical efficiency at 5000 sec. The feasibility of replacing the accelerating grid structure in a high perveance contact ion thrustor has been demonstrated. This development removes electrode durability as a limiting factor in engine design and allows optimizing the overall rocket efficiency to a significant margin over the nonreplacement electrode engine. (Author)

AD-608 721 Div. 27, 14
OTS Prices: HC $1.00/MF $0.50

Atlantic Research Corp., Alexandria, Va.
FEASIBILITY DEMONSTRATION OF PYROLYTIC GRAPHITE COATED NOZZLES.
Quarterly progress rept. no. 3, 1 Aug-31 Oct 64,
by James D. Batchelor. 25 Nov 64, 20p
Contract AF04 611 9708, Proj. 3059
RPL TDR64 176

Unclassified report

Descriptors: (*Rocket motor nozzles, Coatings), (*Coatings, Rocket motor nozzles), (*Pyrolytic graphite, Rocket motor nozzles), Solid rocket propellants, Feasibility studies, Nozzle inserts, Mathematical analysis, Stresses, Erosion, Tests, Fracture (Mechanics), Performance (Engineering), Thickness, Thermal properties.

The objective of this program is to demonstrate the feasibility of pyrolytic graphite coatings for use in uncooled solid propellant rocket nozzles (in a size range of use for practical propulsion units) under very severe operating conditions. In prior work, the excellent serviceability of pyrolytic graphite coatings in 1/2-inch diameter nozzles was demonstrated with propellants having flame temperatures from 5500F to 6500F. In current work, nozzles of 1.1-inch and 2.3-inch diameter are to be tested with a 6550F propellant. This report describes the work of the third quarter of this program. Improvements were made in preparing crack-free sub-scale coated inserts. Flaw-free coatings as thick as 54 mils were prepared. Application of this improved art to full-scale inserts is underway. Stress analysis indicated the merit of alternate substrate materials and deposition work with these is underway. A successful 35-second sub-scale firing was made but during a 60-second firing discrete coating losses were observed. In the first full-scale motor firing excessive erosion was observed from a coating containing a known separation. This behavior was analogous to early sub-scale experience. (Author)

AD-608 788 Div. 27, 30
OTS Prices: HC $4.00/MF $0.75

Giannini Scientific Corp., Santa Ana, Calif.
30 KW ARC-JET THRUSTOR RESEARCH.
Rept. for 19 Nov 63-19 Jan 64,
by James P. Todd. Mar 64, 107p FR024 10338
Contracts AF33 657 10338, AF33 657 8367,
Proj. 3141, Task 314101
APL TDR64 58
Unclassified report

Supersedes AD-601 534.

Descriptors: (*Arc-jet engines, Scientific research), (*Electric propulsion, Arc-jet engines), (*Space propulsion, Arc-jet engines), Thrust, Anodes, Nozzles, Regenerative cooling (Rockets), Hydrogen, Propellants, Test facilities, Test equipment, Tests, Design, Performance (Engineering), Experimental data, Graphics.

A research and advanced developmentprogram on a 30 KW arc-jet thrustor is described herein. An experimental radiation-cooled, hydrogen-propelled thrustor designed under a previous Air Force program had demonstrated a high level of performance with a lifetime greater than 100 hours. The current program, a continued effort at the 30 KW power level, required the attainment of improved performance characteristics (eta > or = 55% at Isp = 1000 secs.) and a lifetime demonstration of 500 hours. To attain these difficult performance requriements a thrustor having a regeneratively-cooled anode/nozzle was designed which maintained as closely as possible the internal geometry which had performed successfully in the previous program. The successful completion of a continuous 500-hour endurance test at the required operating conditions without failure indicates that this 30 KW arc-jet thrustor is indeed as advanced as any other type of electric propulsion system at this time. (Author)

AD-608 797 Div. 27, 12
OTS Prices: HC $1.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
RELIABILITY EVALUATION OF LARGE SOLID ROCKET ENGINES DURING ENGINEERING DEVELOPMENT,
by M. Lipow and D. K. Lloyd. 1959, 22p
STL/TR-59-R002-00548
Contract AF04 647 309
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Reliability), Tests, Statistical analysis, Configuration, Design.

A method of evaluating reliability of large scale rocket engines during a Research and Development Program prior to missile flight tests is presented. Reliability estimates are obtained even though the configuration of the engine is undergoing change and the objectives of test firings vary. Each engine is apportioned into Principal Subsystems which are screened for their degree of representation of the final configuration. The intention of each test firing is determined prior to the test and the behavior of the Principal Subsystem when tested within the engine environment is classified according to pre-specified ground rules as a Success, Failure or Exclusion. These results are then statistically combined to give an estimate of engine reliability. (Author)

AD-608 901 Div. 27
OTS Prices: HC $3.00/MF $0.75

TRW Space Technology Labs., Los Angeles, Calif.
INVESTIGATION OF NONEQUILIBRIUM PHENOMENA IN ROCKET NOZZLES.
Semiannual rept. for 1 Jul-31 Dec 59,
by Dwight Weber. 31 Dec 59, 62p
STL/TR-59-0000-09949
Contract AF04 647 309
AFBMD TR60 32 Unclassified report

Descriptors: (*Nozzles, Nonequilibrium flow), (*Rocket motor nozzles, Nonequilibrium flow), (*Nonequilibrium flow, Rocket motor nozzles), Fluid flow, Hydrogen, Dynamics, Quenching (Inhibition), Shock tubes, Specific impulse, Fluid dynamic properties, Performance (Engineering), Nuclear propulsion, Tests.

Progress in the Investigation of Nonequilibrium Phenomena in Rocket Nozzles is described. Theoretical studies have been directed toward the atomic hydrogen-molecular hydrogen system, and methods of defining the transition region from equilibrium flow to frozen flow have been compared. Using one of the definitions, the theoretical specific impulse of a nuclear engine utilizing hydrogen as the working fluid has been computed, and the results are shown. Existing propellant performance calculations which assume isentropic expansion are applicable without extensive modification. All major parts of the shock tube facility have been fabricated and assembled. Structural tests have been completed, and initial tests on diaphragm rupture have been made. (Author)

AD-608 902 Div. 27
OTS Prices: HC $3.00/MF $0.75

TRW Space Technology Labs., Los Angeles, Calif.
VIBRATIONAL CHARACTERISTICS OF SOLID PROPELLANT ROCKET MOTORS.
Semiannual rept. for 1 Jul-31 Dec 59,
by W. G. Gottenberg. 31 Dec 59, 60p
STL/TR-59-0000-09951
Contract AF04 647 309 Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Rocket motors, Vibration), (*Vibration, Rocket motors (Solid propellant)), (*Rocket motors (Solid propellant), Vibration), Rockets, Rocket propulsion, Rocket propellant, Test methods, Mechanical properties, Cylindrical bodies, Viscoelasticity, Rocket propellant grains, Solid rocket propellants, Solid rocket fuels, Data, Mathematical analysis, Structure, Damping.

A method is described for automatically surveying the mode shapes of a vibrating cylinder in both the axial and circumferential directions. A complete spectrum of modes of vibration of an empty thin-walled, circular cylinder were obtained for both breathing and beam modes at several values of internal pressure. Similar, although not as complete, data were obtained for the same cylinder having a grain of inert solid propellant bonded in its interior. Good correlation with theoretical considerations was obtained for much of these data. Damping was compared for both configurations, vibrating transversely as beams and in one of the breathing modes. Several experimental methods were developed for measuring the dynamic mechanical properties of the solid propellant. (Author)

28. Psychology and Human Engineering

AD-608 482 Div. 28
OTS Prices: HC $3.00/MF $0.75

Vanderbilt Univ., Nashville, Tenn.
STUDIES IN ABSTRACTION LEARNING: VIII. A SIMULATED CLASSROOM STUDY OF RECTROACTIVE INHIBITION AS A FUNCTION OF THE METHOD OF TRAINING ON THE INTERPOLATED TASK.
Technical rept. no. 11,
by Leland E. Thune and Charles J. Long. Jun 64, 79p
Contract Nonr2149 01

Unclassified report

The initial distribution copies contain color which will be shown in black-and-white when it is necessary to reprint.

Descriptors: (*Learning, Transfer of training), (*Transfer of training, Learning), Performance (Human), Inhibition, Students, Performance tests, Machines, Test methods, Psychometrics, Statistical analysis, Analysis of variance.

Modern technology not infrequently demands that persons trained to operate one complex device shift to a different, but related, device. Examples are legion--the pilot shifting from one type of aircraft to another, or the technician changing from one computer or business machine to another. Military technical training programs have been particularly plagued with this problem. Men trained on one type of fire-control, or communications equipment in a service school are likely to encounter different models of these same instruments when assigned to tactical units. The present study was concerned with one aspect of this training problem. If a person is briefly introduced to device A, but is then shifted to a related device, B, on which he receives more extensive training, how should this training be given on device B so as to facilitate, or at least not hinder, his performance when shifted back to A. The familiar 'Learn A--Learn B--Relearn A' retroactive inhibition (RI) paradigm was thus being used, and the method by which the interpolated task was taught and practiced was simply varied. This has been the paradigm most frequently employed in studies of transfer of training, particularly those carried out within the conceptual framework of RI.

AD-608 489 Div. 28, 16
OTS Prices: HC $1.00/MF $0.50

Harvard Univ., Boston, Mass. Medical School.
GROUP PROCESS UNDER DIFFERENT CONDITIONS OF SUCCESS AND FAILURE.
Annual rept. no. 4,
by David Shapiro. Oct 64, 8p
Contract Nonr1866 43, Proj. NR170 518

Unclassified report

Descriptors: (*Psychophysiology, Group dynamics), (*Group dynamics, Psychophysiology), (*Social psychology Adaptation (Physiology)), Behavior, Reaction (Psychology), Social communication, Speech, Learning, Verbal behavior, Galvanic skin response, Pulse rate, Data processing systems.

Papers prepared and published on data collected during the previous year are summarized. An attempt is also made to integrate the results of a number of studies showing the influence of different social and task settings in autonomic response measures. Several new dimensions of comparison appear to be significant: the ability to control or influence the environment, the capacity for initiating activity, and the degree to which the social setting is restricted or free. The data also suggest that the extreme effects of success and failure for the individual in isolation are mitigated in a group setting. Success and failure, moreover, do not have uniform effects in 3-person groups but depend on whether group communication is relatively free or restricted. A second major finding shows that even under restricted conditions of minimal communication and controlled behavioral activity, social roles have different consequences for autonomic response depending on success and failure and on role pairing. Several special problems growing out of the research were investigated: (1) automatic data processing in psychophysiology, (2) characteristics of physiological measures, (3) interrelationship of overt behavior and autonomic response.

AD-608 511 Div. 28
OTS Prices: HC $2.00/MF $0.50

Vanderbilt Univ., Nashville, Tenn.
PREPARATORY SET AND COMPLEX BEHAVIORAL PROCESSES: A REVIEW FROM 1948.
Technical rept. no. 10,
by Leland E. Thune and Ira H. Bernstein. Jun 64, 38p
Contract Nonr2149 01

Unclassified report

Descriptors: (*Learning, Transfer of training), (*Transfer of training, Learning), (*Behavior, Transfer of training), Reaction (Psychology), Conditioned reflex, Performance (Human), Psychometrics, Verbal behavior, Motor reactions, Memory, Retention, Recall, Perception (Psychology).

In general, studies dealing with preparatory sets can be classified as transfer of training models. However, important differences exist between these and the more typical transfer paradigms. In the latter, the original learning (OL) and transfer test (TT) phases are typically quite similar; often the tasks are essentially the same degree of difficulty and differ only in the specific stimuli and responses to be learned. In this sense, the two phases of the experiment consist of autonomous units, each, in the absence of the other, of parallel form and difficulty. In the type of study considered in this paper, the OL task may be quite simple in comparison to the transfer task, as in the typical warm-up (WU)study, or, preparation may consist of a vast number of problems, administered over a significant portion of the life of the individual, as occurs in some forms of the learning how to learn paradigm. Also, as pointed out by Arnoult (1957), the research on the effects of preparatory tasks tends to question the notion that the S-1--R-1: S-1--R-2 paradigm in transfer leads unequivocally to negative transfer. Because of the formidible mass of relevant studies, the authors chose to make some rather arbitrary and restricting boundaries. As the title indicates, they are concerned with those paradigms having implications for human learning, and because of their strong transfer of training bias, their attention is directed primarily to studies interpretable within this framework.

AD-608 517 Div. 28, 23
OTS Prices: HC $1.00/MF $0.50

Group Effectiveness Research Lab., Univ. of Illinois, Urbana.
THE QUASI-THERAPEUTIC EFFECTS OF INTER-GROUP COMPETITION.
Technical rept. no. 19,
by James W. Julian, Doyle W. Bishop, and Fred E.

Fiedler. Oct 64, 19p
Contract DA49 193MD2060

Unclassified report

Descriptors: (*Military training, Adjustment (Psychology)), (*Group dynamics, Adjustment (Psychology)), (*Adjustment (Psychology), Military personnel), Perception (Psychology), Reaction (Psychology), Anxiety, Attitudes, Emotions, Personality, Leadership, Performance (Human), Sociometrics, Statistical analysis.

Nine combat engineering squads competed in their training and garrison duties to test the hypothesis that inter-group competition promotes close interpersonal relations among group members and improves morale and adjustment. Eighteen squads for whom no changes in training were introduced served as controls. Questionnaire measures of interpersonal relations and adjustment were obtained before and after a three month experimental period. Changes in self-perceptions and reactions to military life indicated clearly the relative improvement in adjustment of the members of competitive squads as compared with members of control squads. Men trained under competitive conditions also had a lowered level of manifest anxiety on the Taylor scale. Improvement in the quality of interpersonal relations was indicated by a significantly greater change in within-squad sociometric choices of combat leaders and work partners for the members of competitive squads. However, these improvements did not generalize to non-task aspects of relations among squad members. (Author)

AD-608 568 Div. 28, 12, 23
OTS Prices: HC $1.00/MF $0.50

Naval Training Device Center, Port Washington, N. Y.
VERTICAL ORIENTATION IN A HOMOGENEOUS ENVIRONMENT,
by William Metlay, Milton S. Katz, Paul A. Cirincione, and Gilbert C. Tolhurst. 12 Oct 64, 9p
NAVTRADEVCEN 1H19

Unclassified report

Prepared in cooperation with the Office of Naval Research, Washington, D. C.

Descriptors: (*Proprioception, Target acquisition), (*Target acquisition, Space perception), (*Spacecraft docking, Proprioception), Positioning reactions, Motor reactions, Rendezvous spacecraft, Visual perception, Pilots, Astronauts, Training, Feedback, Test methods.

Since earlier work investigating the problem of target acquisition and positioning adjustment in a homogeneous environment was directed at horizontal accuracy, the present study was conducted in order to define possible relationships between the ability to position a target in the vertical axis and in the horizontal. Four Ss were required to reposition, to geometric center, three targets which originated from six locations, in the vertical axis. In addition, Ss were also required to reposition one of the targets along the horizontal axis. The results for vertical and horizontal accuracy could not be determined separately since vertical and horizontal trials were interspersed in the same experimental series. However, what was shown clearly was that feedback, in terms of knowledge of where geometric center is located, can significantly affect vertical and horizontal positioning. It was suggested that a study be conducted to determine whether feedback can be used, and to what degree, to shape an individual's orientation response in the homogeneous environment. (Author)

AD-608 588 Div. 28, 18
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
A PARADIGM FOR SYSTEM ANALYSIS OF COMMAND AND CONTROL FUNCTIONS.
Scientific rept.,
by Elias H. Porter. 1 Oct 64, 13p SP-1701/001/00

Unclassified report

Presented at the American Psychological Association Meeting, Los Angeles, Calif., 4-9 Sep 64.

Descriptors: (*Command and control systems, Theory), (*Air defense command, Systems engineering), Behavior, Memory, Decision making, Visual signals, Display systems, Data processing systems, Models (Simulations), Symposia, Conditioned reflex.

It is shown in the report that the mating of stimulus to response (S - R) is only part of the total picture. A paradigm conceived in the course of system analysis activities which presents many more behavioral functions is introduced. The new paradigm is that of Stimulus - Organism - Response (S - O - R). The evolution of the paradigm is presented, its usefulness in system analysis is illustrated, and its relationship to individual behavior is demonstrated.

AD-608 598 Div. 28
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570), Wright-Patterson AFB, Ohio.
INFLUENCE OF FIRST TASK PRACTICE AND INTER-TASK SIMILARITY ON TRANSFER OF TRAINING IN A SYMBOL SUBSTITUTION TASK.
Final rept.,
by Marvin Levine, Ross L. Morgan, and Alan D. Neiberg. Oct 64, 25p
Proj. 7183, Task 718306
AMRL TR64 96

Unclassified report

Ohio State Univ., Columbus, Research Foundation, Contract AF33 038 5474.

Descriptors: (*Learning, Transfer of training), (*Transfer of training, Learning), Performance (Human), Education, Psychometrics, Performance tests, Analysis of variance.

This experiment investigated the effects of degree of learning of a first task and degree of similarity between two tasks on the transfer of training from the first to the second task. The basic relationship between the two tasks was such that learning the first might well interfere with learning the second. Twelve groups of 15 college students learned a symbol substitution task to one of four levels of mastery. They were then transferred to a task where the symbols in task I were rearranged to permit three degrees of intertask similarity. Extensive and persistent negative transfer was obtained. During the initial stages of learning task II, negative transfer seemed to decrease as the degree of learning of task I increased. However, during the later stages of task II, negative transfer seemed to increase with an increase in the degree of learning of the first task, especially with the higher degrees of learning of task I. The intertask similarity variable appeared to be significant only during the early stages of learning the second task. These findings differ from previous findings in the extent and persistence of negative transfer and in the tendency for it to increase with higher degrees of first task mastery.

The present findings question the generality of existing transfer principles derived from slowly paced tasks involving relatively few discrete stimuli and responses. (Author)

AD-608 611 Div. 28, 15
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
EXTERNALLY BAYESIAN GROUPS,
by Albert Madansky. Nov 64, 24p RM-4141-PR
Contract AF49 638 700

Unclassified report

Descriptors: (*Game theory, Decision making), (*Group dynamics, Decision making), (*Decision making, Group dynamics), Probability, Decision theory, Statistical functions, Dynamic programming.

Suppose that a group of individuals, each of whom is a Bayesian, is required to make a joint decision, and that although the individuals all agree on the utility function for the problem, they disagree on the prior distribution of the relevant states of nature. An axiom of group rationality is introduced--namely, that to an outsider the decisions of the group appear like the decision of a Bayesian-- and its implications are explored when the group decision-making procedure either can or cannot be amended. (Author)

AD-608 642 Div. 28
OTS Prices: HC $2.00/MF $0.50

Pittsburgh Univ., Pa.
BEHAVIOR IN GROUPS.
Annual rept. no. 2,
by Bernard M. Bass. 15 Nov 64, 34p
Contract Nonr624 14

Unclassified report

Descriptors: (*Group dynamics, Behavior), (*Industrial psychology, Group dynamics), Management control systems, Decision making, Motivation, Social psychology, Leadership, Industrial relations, Game theory, Training, Personnel, Learning, Theory.

During 1963-4, publications and reports continued to center on four areas of organizational psychology: orientation and behavior, simulated organizations, the man-in-the-middle of an organization, and organizational conflict resolution. And, as a consequence of activities at the Graduate School of Business and management associations, an additional area emerged concerning management development. A chapter 'Organizational Psychology' was published in the 1964 Annual Review of Psychology which attempted to review the interdisciplinary contributions to this newly-emerging field. The problem areas discussed were decision processes in organizations, interpersonal relations, organizational structure and design, and the impact of technology on organizational behavior (Leavitt and Bass, 1964). Due to appear in early 1965 is a text 'Organizational Psychology' (Bass, 1965) focused on a systematic approach to understanding the interaction of men and formal organizations. It will deal with organizational goals and values, motivation to work, supervisor and group relations, classical versus modern organization theory, communications, intergroup conflict and executive decision-making.

AD-608 753 Div. 28
OTS Prices: HC $1.00/MF $0.50

Bucknell Univ., Lewisburg, Pa.
THE EFFECT OF RESPONSE MODE ON PROJECTIVE MEASURES OF NEED ACHIEVEMENT AND HOSTILE PRESS.
Technical rept. no. 13,
by Richard C. Teevan and Barry D. Smith. 1964, 12p
Contract Nonr359101, Proj. NR171 803

Unclassified report

Descriptors: (*Projective techniques, Reaction (Psychology)), (*Reaction (Psychology), Projective techniques), Pictures, Fear, Motivation, Behavior, Females, Males, Performance tests, Psychometrics.

Since some concepts currently tested with written Thematic Apperception Test (TATs) have been derived from and compared with concepts originally tested with verbal TATs, it was considered important to test the hypothesis that the verbal response mode would yield higher scores than would written responses. Forty-two male and 19 female Ss in 2 experimental groups responded to TAT pictures projected on a screen. Group I wrote responses while Group II taped responses. On Hostile Press the null hypothesis was not rejected. On Need Achievement, however, the experimental hypothesis was confirmed for both sexes. It was concluded that extreme caution must be used in comparing studies using different response modes in projective tests. (Author)

AD-608 756 Div. 28
OTS Prices: HC $1.00/MF $0.50

Bucknell Univ., Lewisburg, Pa.
THE RELATIONSHIP OF FEAR OF FAILURE, AS MEASURED BY THE HOSTILE PRESS SYSTEM, TO THE CONFIRMING INTERVAL MEASURE OF GOAL-SETTING BEHAVIOR.
Technical rept. no. 12,
by Barry D. Smith and Richard C. Teevan. 1964, 19p
Contract Nonr359101, Proj. NR171 803

Unclassified report

See also AD-608 755.

Descriptors: (*Fear, Motivation), (*Motivation, Reaction (Psychology)), (*Reaction (Psychology), Motivation), Fear, Behaviour, Performance tests, Word association, Females, Males, Psychometrics, Correlation techniques.

The present study was concerned with the relationship between fear of failure motivation (as measured by Hostile Press scores on TAT stories) and the placement of boundaries of the confirming interval in an level of aspiration (LA) situation. Forty-four male and 46 female Ss completed a scrambled words task, in which 3 questions aimed at establishing the confirming interval (CI) were asked for ten sets of 20 scrambled words. The results indicated that: (1) while high hostile press (HP) males had significantly wider CIs than low HP males, high HP females had significantly lower CIs; (2) high HP males showed a significantly positive relationship between HP score and the distance of the upper CI boundary from the past performance mean. For females, this relationship was significant in the opposite direction; and (3) there were no significant relationships between HP and the distance between the lower CI boundary and the past performance mean in either males or females. (Author)

AD-608 757 Div. 28
OTS Prices: HC $2.00/MF $0.50

Bucknell Univ., Lewisburg, Pa.
THE RELATIONSHIP OF THE HOSTILE PRESS MEASURE OF FEAR OF FAILURE TO SELF-IDEAL CONGRUENCE AND ADJUSTMENT.

Technical rept. no. 11,
by Barry D. Smith and Richard C. Teevan. 1964, 26p
Contract Nonr359101, Proj. NR171 803
Unclassified report

See also AD-608 756.

Descriptors: (*Behaviour, Fear), (*Fear, Behaviour), Adjustment (Psychology), Abnormal psychology, Motivation, Projective techniques, Reaction (Psychology), Performance tests, Males, Females, Psychometrics.

Male and female students in an introductory psychology course were given a projective measure of Hostile Press (HP), which differentiates the fear-of-failure from the hope-of-success individual, two measures of self-ideal congruence (Q sort and Self-Rating Inventory), and a measure of adjustment. A correlational analysis showed that in both males and females HP was negatively related to self-ideal congruence and adjustment. Males also showed a negative correlation between HP and 'achievement-related' items on the self-rating inventory, though females did not. Results supported hypotheses concerning failure-avoidant behavior and provided predictive validation of the HP system. (Author)

AD-608 791 Div. 28, 26, 30
OTS Prices: HC $1.00/MF $0.50

Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
A COMPARISON OF PERFORMANCE IN OPERATING THE CRL-8 MASTER SLAVE MANIPULATOR UNDER MONOCULAR AND BINOCULAR VIEWING CONDITIONS.
Final rept. for Dec 63-Mar 64,
by Gerald P. Chubb. Oct 64, 19p
Proj. 7184
AMRL TDR64 68 Unclassified report

See also AD-436 015.

Descriptors: (*Remote-control systems, Human engineering), (*Human engineering, Remote-control systems), (*Positioning devices (Machinery), Remote-control systems), Performance (Human), Handling, Control, Optical phenomena, Visual acuity, Illumination, Perception.

Four pieces of equipment were employed in this study: (1) a Central Research Laboratory, Model 8, master-slave manipulator, (2) a 12-hole formboard and 15 pegs, (3) two stopwatches, and (4) an eyepatch. The CRL-8 is a mechanical, remote manipulator that translates the operator's movements with a 1 to 1 correspondence and provides direct kinesthetic and proprioceptive feedback. The task consisted of placing pegs in the appropriate holes of a formboard. The pegs were circular, 3.8 cm in diameter and 1.9 cm thick. Performance times were recorded for six subjects on a simple remote handling task under two direct viewing conditions: binocular and monocular. All subjects performed under both conditions with counterbalancing between subjects and within subjects between sessions (I and II). The subjects used the master-slave manipulator to perform a shortened and revised version of the Placing Subtest of the Minnesota Rate of Manipulation Test. Performance times for the monocular viewing condition were 20% greater, exhibited greater variability, and reached an asymptotic level later. (Author)

AD-608 798 Div. 28, 12, 16
OTS Prices: HC $2.00/MF $0.50

TRW Space Technology Labs., Los Angeles, Calif.
HUMAN ENGINEERING OR ENGINEERING OF THE HUMAN, WHICH.
by Robert S. Pogrund. 1960, 41p
Unclassified report

Descriptors: (*Human engineering, Spacecraft cabins), (*Space medicine, Astronauts), Closed ecological systems, Adaptation (Physiology), Psychophysiology, Radiation tolerance, Radioprotective agents, Hypothermia, Performance (Human). Reliability, Design, Drugs, Training.

The degree of compromise between the human engineer and the physiologist is a function of space flight duration. Short trips will permit the designing of the space capsule and its internal environment with a minimal degree of comfort to the human passenger. Medium length trips of interplanetary magnitude will require a duplicate of man's comfortable terrestrial environment, if he is to operate optimally as a scientific observer, capable of high performance levels. Extended interstellar space travel may not require the presence of incessant human intelligence, so that aids for ultimate survival are drawn from considerations of pharmacologic agents, hypothermia, adaptation, and yoga. (Author)

AD-608 810 Div. 28, 16
OTS Prices: HC $4.00/MF $0.75

Mount Holyoke Coll., South Hadley, Mass.
THE RANGE OF VISUAL SEARCH.
Final rept.,
by John Volkmann, Horace H. Corbin, Nancy B. Eddy, and Carol Coonley. Nov 64, 108p
Contract AF19 604 3037, Proj. 7682, Task 768201
ESD TDR64 535
Unclassified report

Descriptors: (*Visual perception, Measurement), Thresholds (Physiology), Vision, Geometric forms, Visual acuity, Experimental data, Tests, Reaction (Psychology), Reflexes, Decision making.

The aim was to study the process of visual search in its early phases. Individual human subjects searched in a projected matrix of elements for one element unlike the rest; e.g., for a triangle in a matrix otherwise composed of circles. In the method of lasting exposure, the matrix was exposed until the subject responded, and the dependent variable was the latency of the response. In the method of brief exposure, the exposure time was limited, and the dependent variables were the percentage of positive responses and the latency of the positive responses. The graph begins at nearly zero slope, and usually shows a small discontinuity or a sigmoid transition leading to slightly higher latencies. This triangle locates the critical number (CN): the number of elements at which it occurs. The critical number varies considerably with the type of discrimination required, and with the stimulus difference between the critical and background elements. The critical number represents some discriminatory limit or limits; it may be a limit of area rather than of number. In dealing with large matrices, the subject apparently searches rapidly in a region around the fixation point (the initial sub-matrix). By definition, this has an area equal to that covered by the critical number in the matrix. The interpretation of the critical number and the initial sub-matrix is partly in terms of saccadic eye movements, though none have been photographed. The region of fast search may have at least an approximate shape. One experiment, using the method of brief exposures, indicated the shape to be ovaloid, with most of its area lying above the fixation point.

29. Quartermaster Equipment and Supplies

No Entries

30. Research and Research Equipment

AD-608 499 Div. 30, 32
OTS Prices: HC $5.00/MF $1.00

Massachusetts Inst. of Tech., Cambridge.
SIR: A COMPUTER PROGRAM FOR SEMANTIC INFORMATION RETRIEVAL.
Doctoral thesis,
by Bertram Raphael. Jun 64, 169p MAC-TR-2
Contract Nonr4102 01

Unclassified report

Rept. on Project MAC.

Descriptors: (*Programming (Computers), Information retrieval), (*Information retrieval, Language), (*Language, Information retrieval), Computers, Artificial intelligence, Documentation, Digital computers.

SIR is a computer system, programmed in the LISP language, which accepts information and answers questions expressed in a restricted form of English. This system demonstrates what can reasonably be called an ability to 'understand' semantic information. SIR's semantic and deductive ability is based on the construction of an internal model, which uses word associations and property lists, for the relational information normally conveyed in conversational statements. A format-matching procedure extracts semantic content from English sentences. If an input sentence is declarative, the system adds appropriate information to the model. If an input sentence is a question, the system searches the model until it either finds the answer or determines why it cannot find the answer. In all cases SIR reports its conclusions. The system has some capacity to recognize exceptions to general rules, resolve certain semantic ambiguities, and modify its model structure in order to save computer memory space. Judging from its conversational ability, SIR is more 'intelligent' than any other existing question-answering system. The author describes how this ability was developed and how the basic features of SIR compare with those of other systems.

AD-608 500 Div. 30
OTS Prices: HC $1.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
PROGRAM STRUCTURE IN A MULTI-ACCESS COMPUTER,
by J. B. Dennis. 1964, 16p MAC-TR-11
Contract Nonr4102 01

Unclassified report

Rept. on Project MAC.

Descriptors: (*Programming (Computers), Multiple operation), Data processing systems, Computer storage devices, Dynamics, Scheduling, Compilers, Digital computers.

A multi-access computer (MAC) system consists of processing units and directly addressable main memory in which procedure information is interpreted as sequences of operations on data, a system of terminal devices through which users may communicate with procedures operating for them, and mass memory where procedures and data may be held when not required for immediate reference. One fundamental attraction of the MAC concept is the increased productivity of 'computer catalyzed research' that results from close man-machine interaction. Another attraction is wealth of data and procedures that are accessible to a large user community through the file memory of a MAC system.

AD-608 501 Div. 30
OTS Prices: HC $1.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
SYSTEM REQUIREMENTS FOR MULTIPLE ACCESS, TIME-SHARED COMPUTERS,
by F. J. Corbato. 1964, 14p MAC-TR-3
Contract Nonr4102 01

Unclassified report

Rept. on Project MAC.

Descriptors: (*Programming (Computers), Multiple operation), (*Computers, Systems engineering), Computer storage devices, Design.

Relocation examples and solutions were elaborated in considerable detail to expose the reader to the difficulties encountered with contemporary machines when multiple user multiple-processor systems are considered. The fact that each program may perform unexpectedly, even to the user, demands that running programs be able to be moved as well as to grow and to shrink. As man-machine interaction becomes faster, each program task becomes more intimately connected with secondary storage and with common subprograms; thus effective multiprogramming is essential for efficient use of a multiple access computer system. (Author)

AD-608 502 Div. 30, 32
OTS Prices: HC $2.00/MF $0.50

Massachusetts Inst. of Tech., Cambridge.
THE M. I. T. TECHNICAL INFORMATION PROJECT. I. SYSTEM DESCRIPTION,
by M. M. Kessler. 2 Nov 64, 25p
Contract Nonr4102 01

Unclassified report

Descriptors: (*Data storage systems, Programming (Computers)), (*Information retrieval, Teletype systems), (*Physics, Data storage systems), Models (Simulations), Programming languages, Computers, Monitors, Magnetic tapes, Periodicals, Statistical analysis.

A working model of a technical information system was designed and constructed. The working literature was taken from twenty-one journals in the field of physics. The system utilizes remote consoles to access a time sharing computer facility (Project MAC). Programs were developed for a large variety of search and processing techniques in real time as well as for delayed output. The system is intended to be a prototype operating in a realistic test environment. (Author)

AD-608 512 Div. 30, 14, 15, 20
OTS Prices: HC $1.00/MF $0.50

Parke Mathematical Labs., Inc., Carlisle, Mass.
INVESTIGATIONS ON ELECTRONIC INTERACTIONS IN MATERIALS AND ON DATA PROCESSING THEORY.
Final rept.
Oct 64, 15p
Contract AF19 628 2417, Proj. 4608, Task 460805
AFCRL 64 870

Unclassified report

Descriptors: (*Mathematics laboratories, Scientific research), (*Mossbauer effect, Materials), (*Data

processing systems, Theory), Abstracting, Iron, Diamonds, Combinatorial analysis, Algebras, Matrix algebra, Algebra, Bibliographies, Integral equations, Integrals, Molecular structure, Nuclear physics.

Summary of work done, and abstracts of reports prepared, under the contract on electronic interactions in materials and on data processing theory. (Author)

AD-608 524 Div. 30
OTS Prices: HC $3.00/MF $0.75

Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
REFINEMENT OF THE PULSE TESTING PROCEDURE COMPUTER LIMITATIONS.
Research rept.,
by Sidney Lees and Ray C. Dougherty. Oct 64, 86p
Contract Nonr3897 03, Proj. S R009 01 01
Unclassified report

Descriptors: (*Input-output devices, Test methods), (*Computer logic, Input-output devices), (*Numerical analysis, Integral transforms), (*Integral transforms, Numerical analysis), Signals, Signal-to-noise ratio, Computers.

A basic limitation to the calculation of Fourier transforms and system functions was investigated. It is demonstrated that much of the past difficulty must reside in the inadequateness of the approximation when an insufficient number of data points are employed. There is reason to believe that the number of points should be about ten times as great as has been customary. Where between 100 and 200 points have been considered adequate, at least 1000 points should be used. Expressions were obtained for the error in using approximate forms for exact integrals for the Fourier transform.. It is possible in any specific instance to calculate the error and to make good estimates of how well the approximation fits the exact solution. It is also possible to determine whether a particular expression can be tested against experimentally derived data. (Author)

AD-608 525 Div. 30, 8
OTS Prices: HC $3.00/MF $0.50

Lansdale Div., Philco Corp., Pa.
MICROMINIATURE PROGRAMMABLE LOGIC ELEMENTS.
Final rept. for Oct 61-Jun 64,
by George L. Schnable. Aug 64, 44p
Philco-R-580-Final, Philco-H-9038, supersede,
Contract AF19 628 260, Proj. 4645, Task 464504
AFCRL 64 832
Unclassified report

Descriptors: (*Computer logic, Microminaturization (Electronics)), (*Microminiaturization (Electronics), Feasibility studies), (*Pattern recognition, Digital computers), Silicon compounds, Oxides, Disks, Epitaxial growth, Integrated circuits, Circuits.

The work described was part of an AFCRL-sponsored research and development program on Microminiature Programmable Logic Elements. The ultimate feasibility of the elements was demonstrated by their incorporation into the digital section of a pattern recognition system designated the Parapropagation Pattern Classifier (PPC). The work performed in the first five phases is briefly reviewed. The results of program phases IV and V particularly pointed up difficulties in connection with obtaining isolation in homogeneous silicon wafers. The introduction of the epitaxial isolation technique greatly improved the circuit yield but was not without associated difficulties. Therefore Phase VI, by mutual agreement, was directed at a study of the capabilities and limitations of various techniques for obtaining improved isolation in silicon monolithic microcircuits. The SiO2 isolation process considered as the most promising of the currently available approaches is described in detail, process variations are indicated, and the results of the recommended process are illustrated by a series of photomicrographs. (Author)

AD-608 544 Div. 30
OTS Prices: HC $7.00/MF $1.75

Washington Univ., Seattle. Coll. of Engineering.
MACHINE LEARNING FOR GENERAL PROBLEM SOLVING.
Annual rept.,
by David L. Johnson. Oct 64, 320p
Grant AF AFOSR468 64A
AFOSR 64 2290
Unclassified report

The initial distribution copies contain color which will be shown in black-and-white when it is necessary to reprint.

Descriptors: (*Artificial intelligence, Digital computers), (*Digital computers, Artificial intelligence), Game theory, Trigonometry, Programming (Computers), Programming languages, Simulation, Cybernetics, Attitudes.

Research relevant to problem solving and learning using trigonometric processes is described in Part I. The incorporation of learning into the process of mechanically proving trigonometric identities presents a unique and major step in the field of artificial intelligence. The processes used, and indeed some of the specific techniques and routines, are sufficiently general that they may be applied to other forms of learning. Part II is concerned with research in tree pruning as related to computer game playing. New min-max methods of pruning have been developed with particular emphasis placed upon machine learning to fix pruning parameters. With the naive scoring functions used, the machine does not play a particularly elegant game of chess, but is managing to modify its pruning behavior to improve its play. The programs are operative using the FORTRAN programming language. A sample game as played by the computer is included within this section of the report. Some results of the research dealing with the restraints the man-machine attitudes play upon human use of digital computers in problem-solving contexts are described in P art III.

AD-608 549 Div. 30
OTS Prices: HC $3.00/MF $0.75

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Oct 64, 59p
Unclassified report

Also available on subscription $10.00/year.

Descriptors: (*Naval research, Reports), (*Scientific research, Reports), Volcanoes, Aerosols, Air pollution, Iceland, Meteorological instruments, Refractometers, Hygrometers, Water vapor, Density, Wiring diagrams, Astrophysics, Radio astronomy, Chemistry, Lubricants, Radiactivity, Coatings, Electrochemistry, Electrodes, Silver, Fire extinguishers, Mechanics, Shock (Mechanics), Vibration, Non-destructive testing, Metallurgy, Ceramic materials, Nuclear physics, Communication

systems, Radio, Radar, Lasers, Solid state physics, Sound, Patents.

Contents:
Articles: Atmospheric aerosols near the Surtsey volcano by C.M. Gordon, E. C. Jones and J. I. Hoover; The Fabry-Perot refractometer and the precision NRL Lyman alpha humidiometer.
Scientific Program-progress reports in the following areas: Atmosphere and Astrophysics; Chemistry; Mechanics; Metallurgy and Ceramics; Nuclear and Atomic Physics; Radio, Solid State Physics; Sound.

AD-608 563 Div. 30, 25
OTS Prices: HC $1.00/MF $0.50

Laboratory for Electronics, Inc., Boston, Mass.
ELECTRO-OPTICAL MATRIX DISPLAY.
Interim development rept. no. 1, 1 May-31 Jul 64.
Sep 64, 12p LFE-480-Q1
Contract NObsr91199

Unclassified report

Descriptors: (*Thin films (Storage devices), Display systems), (*Magneto-optic effect, Thin films (Storage devices)), (*Computer storage devices, thin films (Storage devices), Ferromagnetic materials, Powder metals, Nickel, Iron, Colloids, Glass seals, Epoxy plastics, Polyamide plastics, Thickness.

As part of research on ferro-magnetics with applications to new memory and display devices , a workable electro-optical display is being fabricated using the magnetic properties of RIS 1 thin films and the Bitter powder pattern technique. A monotonic increase of domain spacing with thickness of thin film was shown for 86/14 Ni/Fe films evaporated at 200 C onto no. 3 Corning glass substrates. The thickness must be above a few thousand Angstroms to obtain RIS 1 properties and good display intensity. Increasing the film thickness decreases the field strength required for switching but leads to less brilliant display images. For Ni/Fe films the magnetostriction constant must be negative to yield film elements useful for the display specified, but the applied fields required to cause film magnetization increase as the Ni concentration increases. Best display elements appear to be Ni/Fe films with Ni at 83 to 86% and thicknesses between 5000 and 10,000 Angstrons; coercive forces would be 10 oersteds for these films. Good glass-to-glass seals with enclosed Bitter Solution was obtained with a mixture of CIBA polyamide and epoxy resins.

AD-608 573 Div. 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
DESIGNING AN ARTIFICIAL STUDENT.
Scientific rept.
by Alko Hormann. 7 Oct 64, 15p SP-1764

Unclassified report

Presented at the International Meeting of the Operations Research Society of America (Western Section), Honolulu, Hawaii, 15 Sep 64.

Descriptors: (*Artificial intelligence, Design), Learning, Programming (Computers).

This paper describes the design philosophy and conceptual scheme for Gaku--a system of computer programs that is capable of exhibiting learning and problem-solving behavior. The concrete manifestation of this system consist of four mechanisms--a programming mechanism, a problem-oriented mechanism, a planning mechanism, and an induction mechanism--each of which is described. The operation of all four mechanisms is governed and regulated by an executive program called the mechanism coordinator. As an example of the operation of the system, its behavior in finding solutions to increasingly difficult versions of the 'Tower of Hanoi' puzzle is related. Suggestions are made as to appropriate directions for further research that would improve and broaden the capabilities of the system. (Author)

AD-608 575 Div. 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
THE COMPUTER AND THE PROMISE OF AUTOMATION.
Scientific rept.,
by Christopher J. Shaw. 15 Sep 64, 14p
SP-1751/000-01

Unclassified report

Presented at a meeting of the Southern California Occupational Therapy Association, 15 Sep 64.

Descriptors: (*Computers, Automation), (*Automation, Computers), (*Cybernetics, Computers), Analog computers, Digital computers, Information retrieval, Data processing systems, Programming (Computers), Compilers, Management control systems.

Briefly reviews the history of automation. Describes the computer as a machine for processing information. Outlines several computer programs such as SYNTHEX, HELP, STUDENT and others. Discusses the computer in terms of the job opportunities it ends and creates. Suggests areas in which there is work to be done. (Author)

AD-608 585 Div. 30, 14, 20
OTS Prices: HC $2.00/MF $0.50

Harry Diamond Labs., Washington, D. C.
TRACER METHOD OF MEASURING LOW WATER-VAPOR PERMEABILITY,
by E. R. Nelson, R. M. Shellenbarger, and A. Besold. 1 Oct 64, 43p
Projs. 1P523801A300, 96300
HDL TR1254

Unclassified report

Descriptors: (*Plastics, Permeability), (*Tracer studies, Permeability), Films, Porosity, Water vapor, Labeled substances, Carbon, Aliphatic compounds, Counting methods, Geiger counters.

A rapid method for the measurement of rates of permeation of water vapor through polymeric films of very low permeability was studied. It was based on the reaction of C-14-labeled barium carbide with water to give barium hydroxide and radioactive acetylene. A sweep-gas apparatus, which incorporated a Geiger tube for counting the acetylene, was built and measurements were taken under steady-state conditions. This method proved to be rapid but neither absolute nor precise. While corrections might be applied to yield absolute values, none of the modifications that were attempted seemed to improve the reproducibility. Methods based on counting radioactive acetylene have been discontinued in favor of a method based on detecting simple unlabeled, hydrocarbons, e.g., acetylene, with an argon detector. (Author)

AD-608 586 Div. 30, 9
OTS Prices: HC $4.00/MF $0.75

Gas Dynamics Lab., Princeton Univ., N. J.

THE PRINCETON UNIVERSITY HIGH PRESSURE HYPERSONIC NITROGEN TUNNEL N-3. PART I. FACILITY DESCRIPTION. PART II. CALCULATION OF GAS CHARACTERISTICS AND EVALUATION OF EFFECTS OF VIBRATIONAL NON-EQUILIBRIUM. PART III. PRELIMINARY MEASUREMENTS,
by I. E. Vas and G. Koppenwallner. Jul 64, 110p
AER-609
Contract AF49 638 1271
AFOSR 64 1422

Unclassified report

Descriptors: (*Hypersonic wind tunnels, Nitrogen), Hypersonic flow, Thermodynamics, Continuum mechanics, Hypersonic nozzles, Conical nozzles, Nonequilibrium flow, Solidfied gases, Mathematical analysis, Graphics, Measurement, Vibration, Pressure.

A hypersonic wind tunnel using nitrogen as the test fluid was built to operate in the continuum and slip flow regimes. The free stream Mach number in the 6-8 inch diameter test section varies from 16-25 with stagnation pressures from 2000-5000 psia and stagnation temperatures to 3000K. The testing time is presently limited to 25 minutes. For the temperatures and pressures encountered, no dissociation effects are experienced but vibrational effects must be included. A freezing criterion was developed and applied to the nozzle configuration. For the operating conditions, it was found that the gas can be considered to be frozen during the entire expansion process. Measurements of wall static pressure and transverse pitot pressure traces were conducted in the test region generated by the conical nozzle. The effect of stagnation pressure on Mach number was found to be important.

AD-608 587 Div. 30, 26, 32
OTS Prices: HC $4.00/MF $0.75

System Development Corp., Santa Monica, Calif.
COMMUNICATION AND LARGE ORGANIZATIONS,
Professional paper,
by Beatrice Rome and Sydney Rome. 4 Sep 64, 108p
SP-1690/000/00
Contract AF49 638 1188 Unclassified report

Two lectures presented at the Air Force Office of Scientific Research Summer Scientific Seminar on Communication Cybernetics, Cloudcroft, N. Mex., 17-18 Jun 64.

Descriptors: (*Social communication, Group dynamics), (*Sociometrics, Systems engineering), (*Command and control systems, Simulation), Communication systems, Cybernetics, Sociometrics, Computers, Performance (Human), Decision making, Feedback, Manpower studies, Teaching machines, Symposia, Sociology.

Leviathan, a method used for studying communication in large social organizations, is described. The Leviathan method comprises a theoretical framework, a system of computer programs, a series of experimental simulations in a laboratory, a repertory of experimental controls and quantitative measurements of organizational performance. Some of the advantages and experimental results of the Leviathan method are discussed. It is concluded that the entire area of organizational hierarchy (and heterarchy) and the wider complex area of the organization of human society is open to experimental investigation.

AD-608 602 Div. 30, 9
OTS Prices: HC $1.00/MF $0.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
EMPLOYMENT OF PELLICULAR SENSING ELEMENTS TO STUDY HEAT EXCHANGE IN A DISSOCIATED GAS FLOW,
by Yu. A. Polyakov. 14 Nov 64, 16p
FTD TT63 1056; TT 65 60266

Unclassified report

Unedited rough draft trans. of mono. Fizicheskaya Gazodinamika, Teploobmen i Termodinamika Gazov Vysokikh Temperatur (Physical Gas Dynamics, Heat Exchange and Thermodynamics of Gases of High Temperatures) Moscow, 1962, p. 251-260.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Gas flow, Heat transfer), (*Heat transfer, Measurement), (*Temperature sensitive elements, Heat transfer), Dissociation, Recombination reactions, Supersonic flow, Shock tubes, Shock waves, Resistance thermometers, Design, Test equipment, Metal films, Copper, Platinum, Nickel, Thickness, Surface properties, Thermodynamics, Theory, Mathematical analysis.

Thermal flows during dissociation and recombination of gas particles reaching a body at supersonic velocity can be determined if short action devices are used. The theory of the method of investigating heat exchange by the nonstationary temperature of body surface is reduced to the task of solving and analyzing the problem of finding the temperature field of the plate and a semilimited body, being in contact.

AD-608 660 Div. 30, 1, 12, 25
OTS Prices: HC $2.00/MF $0.50

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ANALYSIS OF METHODS FOR DETERMINING OUTGASSING RATES,
by J. I. Shipp and J. D. Trolinger. Dec 64, 27p
Contract AF40 600 1000, Projs. 6950, NW2210, Task 695 003
AEDC TDR64 180

Unclassified report

Descriptors: (*Degasification, Materials), (*Gas flow, Measurement), (*Vacuum pumps, Gas flow), Flowmeters, Pressure, Gases, Adsorption, Absorption, Sublimation, Conductivity, Reviews, Ionization gages, Mass spectroscopy, Spectrum analyzers, Vacuum.

Methods of determining outgassing rates of materials under vacuum are discussed with emphasis on the accuracy and limitations of each. Pressure measurement techniques included are rate of evacuation, rate of rise, and a number of conductance methods. Assuming Langmuir's model for sticking probability, it is shown that these techniques can introduce large errors in determinations of desorption rates due to incorrect choice of pumping speed. Instrument calibration procedures and comparisons of results employing different techniques are also given. (Author)

AD-608 663 Div. 30
OTS Prices: HC $1.00/MF $0.50

Itek Corp., Waltham, Mass.
RUSSIAN STENOTYPE EQUIPMENT.
Interim technical rept.,
by David Loeb, Richard Markus, and Phil Novic.
Oct 64, 22p
Contract AF30 602 3213, Proj. 5591
RADC TDR64 324 Unclassified report

Descriptors: (*Data processing systems, USSR), (*Input-output devices, Data processing systems), Programming (Computers), Typewriters, Design, Language, Teaching machines, Display systems.

The Russian Stenotype program is concerned with the development of a stenotype input system for automatic translation of spoken and written Russian. Under this program an engineering model of the Russian stenotype equipment is being developed to demonstrate the feasibility of such a high-speed, manual, encoding system. This report is given in three parts, each related to a main section of the program: the stenocode (and keyboard) design study, the digital hardware and the steno teaching machine. The stenocode description includes three parts: (1) keyboard design; (2) the Numbered Encoding Code (NEC) (3) the Spelling-Out Code (SOC) encoding system. Some details of the NEC system remain to be worked out and will be covered in the final report. Digital hardware is devoted to the serializer-decoder. The Steno teaching machine discussion includes a description of some of the hardware and its operation. (Author)

AD-608 680 Div. 30, 2, 12
OTS Prices: HC $7.30/MF $2.00

Comstock and Wescott, Inc., Cambridge, Mass.
INVESTIGATION OF ULTRAVIOLET SOLAR RADIATION AND ITS INFLUENCE ON THE AEROSPACE ENVIRONMENT.
Final rept.,
by J. D. Sullivan, J. F. McGrath, and W. J. Thorburn.
31 Aug 64, 428p
Contracts AF19 604 7496, AF19 604 5693, Projs. 6687, 6688, Tasks 668801, 23456
AFCRL 64 773

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Solar radiation, Measurement), (*Space environmental conditions, Ultraviolet radiation), (*Upper atmosphere, Ultraviolet radiation), X rays, Scientific satellites, Spectrophotometers, Telemeter systems, Photoelectric effect, Instrumentation, Proportional counters, Targets, Design, Production.

The report describes the development, construction and flight of research instruments used on various space vehicles for the investigation of Ultraviolet Solar Radiation. Records the design features of Retarding Potential Analyzers used for the analysis of environmental charged particles in the aerospace environment and the analysis of photoelectron emission from targets exposed to unfiltered solar radiation, of grazing incidence telemetering monochromators for measurement of the intensity of solar radiation between 60 and 1300 Angstrom during (a) short duration rocket experiments, and (b) prolonged satellite experiments (OSO), of spectrophotometers for measurement of the soft X-ray and EUV radiation on the POGO satellites, of proportional counter spectrometers for measuring X-ray radiation in the 1 to 10 Angstrom range. Experiments involved 25 space probes. Describes the design and construction details of the associated laboratory equipment used in developing, testing and calibrating the above instruments. (Author)

AD-608 681 Div. 30, 18
OTS Prices: HC $3.00/MF $1.25

Office of Naval Research, Washington, D. C.
NAVY SCIENCE SYMPOSIUM (8th). AUTOMATION AND THE NAVY SPONSORED BY THE OFFICE OF NAVAL RESEARCH, MAY 13-15, 1964 AT THE U.S. NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIFORNIA.
1964, 201p
ONR 21 V1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Symposia, Naval research), (*Automation, Navy), (*Navy, Automation), Naval personnel, Military requirements, Thin films (Storage devices), Manufacturing methods, Design, Milling machines, Microminiaturization (Electronics), Analog computers, Digital computers, Analog-digital computers, Modules (Electronic), Input-output devices, Weather forecasting, Tactical warfare, Simulation, Analysis, Experimental data, Data processing systems, Sound signals, Identification systems, Hydrodynamics, Ships.

Contents:
Numerical control related to thin film circuit fabrication; Projected effects of automation on future navy personnel requirements; Computers-analog, digital, or hybrid; Modular computer exploratory development; Computer applications in environmental prediction at fleet numerical weather facility; Tactical simulation methods; Coded-a program leading to electronic design automation; Automation in the acquisition and reduction of experimental data at Nol, White Oak; Machine classification of acoustic signals; A sensing device for the measurement of steam quality; The application of computers to some hydrodynamic problems in ship design.

AD-608 692 Div. 30
OTS Prices: HC $4.00/MF $1.00

Litton Systems, Inc., Waltham, Mass.
PATTERN RECOGNITION RESEARCH.
Final rept.,
by George S. Sebestyen and Jay L. Edie.
14 Jun 64, 134p DS-64-025
Contract AF19 628 1604, Proj. 5632, Task 563205
AFCRL 64 821

Unclassified report

Descriptors: (*Pattern recognition, Statistical processes), (*Artificial intelligence, Pattern recognition), Bionics, Decision theory, Probability, Statistical functions, Special purpose computers, Programming (Computers), Learning, Adaptive control systems, Mathematical analysis.

This report is concerned with the adaptive estimation of joint probability densities from a finite number of multi-dimensional vectors of known classification. An estimation procedure for the approximation of probability densities in the form of an n-dimensional histogram is described. The location and shape of the cells in the histogram are dependent on the data. The quality of the estimation procedure and its dependence on the order in which samples of known classification are introduced are described. Two quality measures are studied, one that estimates the probability that the decision is optimum and the other that the decision is correct. Techniques for analysis of data of unknown origin prior to the application of the adaptive pattern recognition techniques are studied. The measurement selection problem of pattern recognition is investigated and the mathematical and engineering problems are separated. Figures of merit to evaluate the usefulness of parameter sets are developed, and mathematical formulations of the parameter selection problem are given. (Author)

AD-608 696 Div. 30, 16
OTS Prices: HC $1.00/MF $0.50

California Univ., Davis.

ELECTRONIC COUNTING OF ELONGATED PARTICLES IN SUSPENSION.
Final rept.,
by David R. Viglierchio. 8 Sep 64, 5p
Grant Nonr G00037 62, Proj. NR103 550
Unclassified report

Descriptors: (*Counting methods, Geometric forms), (*Nematodes, Counting methods), Coincident counting, Electronic equipment, Monitors, Electrical conductance.

A counting instrument is proposed that could count elongated particles, such as nematodes, individually in the presence of a suspension of differently shaped particles; the sensor of the device would have detector probes spaced along a tunnel through which the rod-like particles would pass. In the conductivity detector, the nematode passing between opposing electrodes in the tunnel interrupts the normal current through the electrolyte, effecting the indicator pulse. The detectors are spaced according to nematode length so that the same nematode will produce a pulse at each detector; the coincident pulses are modified electronically so that pulse height and width can be used to distinguish a nematode from associated debris.

AD-608 718 Div. 30, 9
OTS Prices: HC $0.50/MF $0.50

Naval Research Lab., Washington, D. C.
THE NRL AIR RESISTANCE METER, MODEL II.
Final rept.,
by K. D. Lawrence, J. A. Young, and R. H. Collins.
30 Oct 64, 8p
Proj. RR001 43 4701
NRL 6173
Unclassified report

Descriptors: (*Test equipment, Drag), (*Drag, Test equipment), (*Flowmeters, Air), Gas flow, Gas filters, Materials, Paper, Calibration, Design, Aerosols, Penetration, Manometers, Operation, Meters.

The resistance to airflow is one of the basic characteristics of aerosol filtration materials. With the relatively recent study and development of new low-resistance filters and canisters, there was a need for an improved air resistance meter. In response to this need, NRL designed a new air resistance meter which provides accuracy, versatility, and rapidity of measurement. It utilizes a system of three parallel air lines, each designed to accommodate a specific range of airflows and each with its own separate control valve. These serve to furnish a more accurately calibrated span of airflows up to 100 liters/minute. The instrument is mounted on a table making a convenient semiportable laboratory device. This device has a pneumatically operated chuck to hold the filter sample. The chuck provides uniformity and rapidity of operation and is designed to allow inserts and other alterations to be made easily. The new air resistance meter can be used in conjunction with other equipment to measure airflow resistance and aerosol penetration simultaneously. (Author)

AD-608 758 Div. 30
OTS Prices: HC $1.00/MF $0.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN APPROACH TO GIANT-STEPPING.
Group rept.,
by E. Weiss. 23 Nov 64, 14p LL-1964-70
Contract AF19 628 500
ESD TDR64 581
Unclassified report

Descriptors: (*Programming (Computers), Sequences), (*Sequences, Programming (Computers)), Binary arithmetic, Operations research, Control sequences, Polynomials, Mathematical logic, Numbers.

In certain situations there is a need for a binary sequence with extremely long period (to be measured in years, say) with equi-distribution of zero and ones (and for pairs, triples, etc. insofar as possible) and having an additional property which may be called giant-stepping. The author describes one procedure for handling this problem; the approach is based on the assumption that it is neither feasible nor desirable to set up way stations (whether pre-programmed or not) along the way. (Author)

AD-608 761 Div. 30, 14, 17, 25
OTS Prices: HC $1.00/MF $0.50

Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
ENGINEERING AND APPLIED PHYSICS RESEARCH PROGRESS REPORT NO. 1, SEPTEMBER 1, 1963-SEPTEMBER 1, 1964,
by David Turnbull. 25 Sep 64, 6p
Contract Nonr1866 50, Proj. NR032 485
Unclassified report

Descriptors: (*Scientific research, Reports), Boron compounds, Oxides, Crystallization, Melting, Surface tension, Spheres, Crystal structure, Alloys, Nickel alloys, Phosphorus alloys, Metal films, Cobalt alloys, Phase studies, Ferromagnetic materials.

Topics include: Crystallization and melting of B203; Surface tension of B203; New packing of uniform spheres; Formation and properties of amorphous alloys.

AD-608 786 Div. 30, 12
OTS Prices: HC $4.00/MF $1.00

Plasmadyne Corp., Santa Ana, Calif.
HYPERTHERMAL RESEARCH TUNNEL DEVELOPMENT AND TRANSPORT PROPERTY MEASUREMENTS.
Final summary rept.,
by Daphne Christensen and Rolf D. Buhler. 30 Jan 62, 141p Plasma-FR081-1313
Contract DA04 495ORD1313
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hypersonic wind tunnels, Scientific research), (*Transport properties, Measurement), Ablation, Reentry vehicles, Electric arcs, Flight, Simulation, Plasma physics, Supersonic nozzles, Tests, Calibration, Power supplies, Vacuum apparatus, Cooling, Materials.

The report summarizes the various research and development activities carried out during the period June, 1959 to December, 1960, leading to the completion of the Plasmadyne-NASA Hyperthermal Wind Tunnel. Some of the significant steps in the development of this tunnel are summarized. Other sections of the report present a description of the Arc Tunnel Facility and flight simulation capability, a brief review of arc generator development technology and a summary of plasma diagnostic and calibration experiments carried out in the facility. In order to demonstrate the flexibility and range of the tunnel, a typical materials evaluation test is described in the final section. The concept of flight simulation and scaling and related calculations are presented.

AD-608 833 Div. 30, 5, 18
OTS Prices: HC $2.00/MF $0.50

Mitre Corp., Bedford, Mass.
THE COLINGO SYSTEM DESIGN PHILOSOPHY,
by James F. Spitzer, Joseph G. Robertson, Jr.,
and Durwood H. Neuse. Nov 64, 48p Mitre SR-126
Contract AF19 628 2390, Proj. 492
ESD TDR64 159
Unclassified report

Descriptors: (*Command and control systems, Air Force), (*Programming languages, Digital computers), (*Digital computers, Programming (Computers)), Data processing systems, Errors, Corrections, Design, Machine translation, Compatability, Communication systems, Computer logic, Compilers, Control sequences.

This report describes the design and operation of COLINGO (Compile On-LINe and GO), a program system embodying a computer control and query language that provides the operator with a grammar and vocabulary approximating English to control program data and equipment in a data processing system. COLINGO provides both logical and mathematical control of data in the system, and allows the operator to specify the output format and content. Additionally, it provides the capability of on-line programming in a higher-ordered language called the COLINGO Control Language (CCL). The system provides internal editing, detection, and error correction features. A primary design objective was to make COLINGO adaptable to a changing set of requirements and particularly responsive to data compatability, on-line programming, simple extension, and good man-machine interface. This necessitated maintaining independence of data from programs so that changes in one do not affect the other. The objective was achieved by means of a common retrieval and control program that uses a set of dictionary tables as the translation medium b between programs and data. With this concept, changes in programs or data are reflected in modifications to the tables instead of the usual modification to the data or programs, or both. (Author)

AD-608 844 Div. 30, 18
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PROBLEMS OF PLANNING AND DECISION IN MILITARY R and D,
by Robert W. Buchheim. Sep 64, 12p P-3021
Unclassified report

Text of a talk presented to the Tenth Annual and First International Meeting, Western Section, Operations Society of America, co-sponsored by the Operations research Society of Japan and the Hawaii Univ. Coll. of Business Administration, Honolulu, 14 Sep 64. Prepared in cooperation with the Air Force, Washington, D. C.

Descriptors: (*Armed forces research, Research program administration), (*Research program administration, Armed forces research), Operations research, Management planning.

This paper is the test of a talk presented to the Tenth Annual and First International Meeting, Western Section, Operations Society of America, co-sponsored by the Operations Research Society of Japan and the University of Hawaii, College of Business Administration, September 14, 1964.

AD-608 881 Div. 30
OTS Prices: HC $5.00/MF $1.00

Electronic Systems Lab., Mass, Inst. of Tech., Cambridge.
SYNTHESIS OF SEQUENTIAL SWITCHING NETWORKS.
Final rept.,
by A. K, Susskind, D. R, Haring, C. L. Liu, and K. S. Menger. Oct 64, 174p ESL-FR-216
Contract AF33 657 11677, Projs. DSR9800, 5581, Task 7062
RADC TDR64 492 Unclassified report

Descriptors: (*Switching circuits, Synthesis), (*Networks, Computer logic), Input-output devices, Sequence switches, Iterative methods, Circuits, Computers, Computer storage devices, Theorems, Combinatorial analysis, Permutations, Algebra.

This report presents results of studies in the synthesis of sequential switching networks. Topics covered are the synthesis of permutation machines with threshold elements, in particular one threshold element per memory element; a method of synthesis in which the combinational logic of any sequential circuit may be realized by means of a cascaded arrangement of S-input, S-output logic blocks (S denotes number of state variables). That approach has applicability in integrated circuit realization of computers. Other topics are in the synthesis of sequential switching circuits in shift-register form. (Author)

AD-608 894 Div. 30
OTS Prices: HC $3.00/MF $0.75

Computer Associates, Inc., Wakefield, Mass.
AMBIT: A PROGRAMMING LANGUAGE FOR ALGEBRAIC SYMBOL MANIPULATION.
Scientific rept. no. 4,
by Carlos Christensen. 15 Oct 64, 59p
Contracts AF19 628 419, AF30 602 3342, Proj. 4641, Task 464102
AFCRL 64 909 Unclassified report

Descriptors: (*Programming languages, Algebra), (*Algebra, Programming languages), Programming (Computers), Numerical methods and procedures, Identities, Control sequences, Computer logic, Data processing systems, Digital computers.

This paper defines a programming language system called AMBIT (Algebraic Manipulation By Identity Translation). The AMBIT language is intended for the precise description of the operations of mathematics in general, and programs in the languages are suitable for efficient compilation and execution by an automatic computer. The language is distinguished by its adherence to an important portion of the conventional notation of algebra, the 'identity'. AMBIT uses the 'identity' to express in a single linguistic structure an arbitrarily complex sequence of elementary symbol-manipulation operations, just as FORTRAN and ALGOL use the 'formula' to express in a single linguistic structure an arbitrarily complex sequence of arithmetic operations. Thus AMBIT attempts to serve algebra as FORTRAN and ALGOL serve arithmetic. (Author)

31. Ships and Marine Equipment

AD-608 540 Div. 31, 30
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
THE TMB TWO-COMPONENT PALLOGRAPH, ITS CHARACTERISTICS AND APPLICATION,
by Francis F. Vane. Sep 64, 23p
Proj. S F013 11 01, Task 1351
DTMB 1769

Unclassified report

Descriptors: (*Ship hulls, Vibration), (*Vibration, Measurement), Recording systems, Recording paper, Seismographs, Calibration, Test facilities, Test methods, Design.

The two-component pallograph was built to measure vertical and horizontal vibrations of ship hulls. It can record amplitudes from 0.5 to 150 mils single amplitude over a frequency range of about 2/3 to 60 cps. This report describes the instrument and its response characteristics and furnishes information on installation. Also included are a summary of experience in the design and modification of the unit and an evaluation of certain deficiencies which have not yet been corrected. (Author)

AD-608 615 Div. 31, 9
OTS Prices: HC $4.00/MF $0.75

David Taylor Model Basin, Washington, D. C.
A METHOD FOR PREDICTING THE PLATE-HULL GIRDER RESPONSE OF A SHIP INCIDENT TO SLAM,
by Ralph C. Leibowitz and Joshua E. Greenspon.
Oct 64, 103p
DTMB 1706

Unclassified report

Descriptors: (*Mathematical prediction, Marine engineering), (*Ship structural components, Mechanical properties), Ships, Ship plates, Ship hulls, Hydrodynamics, Stresses, Impact shock, Programming (Computers), Deformation, Honeycomb cores.

A method is presented for computing the component and overall dynamic response and stress patterns for a ship subject to slam in heavy seas. These patterns include primary, secondary, and tertiary deflections and stresses produced in the hull girder stiffened plate sections of the hull and plating between stiffeners, respectively; the analyses for a vibrating free-free, continuous nonuniform beam and for a vibrating cross-stiffened plate with elastic rotational constraints at the boundary, are combined. Experimental programs to check the theory are recommended. Plastic deformation considerations for the plates are also treated. (Author)

AD-608 688 Div. 31
OTS Prices: HC $1.00/MF $0.50

David Taylor Model Basin, Washington, D. C.
A TMB MEAN LINE SERIES TO DELAY CAVITATION INCEPTION,
by Richard J. Wirth. May 60, 22p
Proj. S R009 01 01
DTMB 1429

Unclassified report

Descriptors: (*Propellers(Marine), Cavitation), (*Cavitation, Inhibition), Equations, Statistical distributions, Mathematical analysis, Angle of attack, Design, Pressure.

The derivation of a generalized mean line series, designated as the TMB 'c' mean lines is presented. This series is designed to delay cavitation inception on propeller blades. Included are figures showing the relationship between the ideal angle of attack and the parameters which compose the mean line equations, and examples of various 'c' mean lines. (Author)

AD-608 876 Div. 31
OTS Prices: HC $6.00/MF $1.25

Southwest Research Inst., San Antonio, Tex.
STUDY OF AIRBORNE NOISE FROM SHIPBOARD MACHINERY.
Final technical rept. for 20 Jun 63-19 Jun 64,
by Cecil R. Sparks, Richard A. McCoy, and J. C. Wachel. 19 Jun 64, 241p
Contract NObs88636, Projs. SF013 11 01, 04 1383, Task 1357

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Ship noise, Machines), Noise, Measurement, Environmental tests, Airborne, Acoustic insulation, Vibration isolators, Sound transmission, Sound, Adsorption, Naval vessels (Combatant), Performance (Human), Naval personnel, Ship structural components.

A comprehensive survey of noise in combatant ships shows that airborne sound levels generated by machinery items are above specifications in several shipboard spaces. Although absolute noise evaluation of individual machines is difficult while underway, dockside tests can be used to define such characteristics for most such items. These characteristics are discussed and compared, and total environmental noise conditions are evaluated on individual and statistical basis for various machinery and personnel spaces. Existing noise conditions at sea and dockside are compared to applicable habitability criteria, together with an analysis of reported effects of sound on personnel. Based upon the broad survey of equipment and environmental noise characteristics discussed, it is possible to generalize upon approaches and techniques for controlling airborne noise aboard ship. In addition, the applicability of specific treatments are discussed for several noisy items, together with predictions and data on the effectiveness of such treatments.

32. Miscellaneous Arts and Sciences

AD-608 567 Div. 32
OTS Prices: HC $1.00/MF $0.50

Stanford Univ., Calif.
A SPECTRAL STUDY OF 'OVERADJUSTMENT' FOR SEASONALITY.
Technical rept., no. 1,
by Nigel F. Nettheim. 11 Nov 64, 23p
Contract Nonr225 80, Proj. NR042 234
Unclassified report

Jointly supported by the Army, Navy, and Air Force.

Descriptors: (*Economics, Mathematical analysis), Manpower studies, Commerce, Periodic variations, Probability, Mathematical models, Graphics.

The usual model for an economic time series contains an irregular factor assumed (except for strikes, etc.) to be random. A random series, of course, will have components of roughly equal magnitude at all frequencies; thus in particular a seasonal pattern and trend will by chance occur in such a series. Hence decomposition techniques should allow a certain amount of seasonality and trend to remain in the estimated irregular factor. This fact has not been taken into account by methods used to date, so it is not surprising that noticeable troughs appear in the spectrum of estimated irregular factors. This phenomenon is called 'overadjustment'. The present paper proposes a method for recovering the overadjustment and gives some preliminary empirical results. The procedure of over-adjustment and recovery is regarded as a logical one in the absence of a method of decomposition using the spectrum directly. (Author)

AD-608 574 Div. 32, 30
OTS Prices: HC $2.00/MF $0.50

System Development Corp., Santa Monica, Calif.
IS AUTOMATIC CLASSIFICATION A REASONABLE APPLICATION OF STATISTICAL ANALYSIS OF TEXT.
Scientific rept.,
by Lauren B. Doyle. 31 Aug 64, 34p SP-1753
Unclassified report

Descriptors: (*Classification, Subject indexing), (*Statistical analysis, Classification), Information retrieval, Automatic, Data processing systems, Input-output devices, Computers, Documentation.

The crucial question of the quality of automatic classification is treated at considerable length, and empirical data are introduced to support the hypothesis that classification quality improves as more information about each document is used for input to the classification program. Six non-judgmental criteria are used in testing the hypothesis for 100 keyboard lists (each list representing a document) for a series of computer runs in which the number of words per document is increased progressively from 12 to 36. Four of the six criteria indicate the hypothesis holds, and two point to no effect. Finally, the future of automatic classification and some of the practical problems to be faced are outlined.

AD-608 577 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

System Development Corp., Santa Monica, Calif.
IS INFORMATION RETRIEVAL NOW AN ESTABLISHED SCIENTIFIC DISCIPLINE.
Scientific rept.,
by Ronald E. Wyllys. 9 Oct 64, 9p SP-1735
Unclassified report

Presented at the National Conference of the Association for Computing Machinery (19th), Philadelphia, Pa., 25 Aug 64.

Descriptors: (*Information retrieval, Scientific research), Analysis.

The negative case is presented in a debate on the question: 'Resolved: Information retrieval is now an established scientific discipline with well-defined goals, methods, and evaluation techniques.' The theme of the negative argument is that information retrieval is not a science. Rather, it is an applied field, which deals with pressing, practical problems. Its workers are primarily concerned with achieving satisfactory working solutions, and only secondarily concerned with two factors that characterize research in true scientific disciplines--the basic understanding of some aspect of nature and the development of theory. Some philosophical definitions of science are quoted, and a comparison is made between IR and what is clearly an applied field, the desalinization of sea water. The paper concludes that although IR is not yet a scientific discipline, workers in the field have at least achieved the level at which they can recognize the basic scientific problems underlying IR. (Author)

AD-608 609 Div. 32
OTS Prices: HC $4.00/MF $1.00

RAND Corp., Santa Monica, Calif.
SOVIET GOVERNMENT GRAIN PROCUREMENTS, DISPOSITIONS, AND STOCKS, 1940, 1945-1963,
by Nancy Nimitz. Nov 64, 121p RM-4127-PR
Contract AF49 638 700
Unclassified report

Rept. on Proj. RAND.

Descriptors: (*Agriculture, USSR), (*USSR, Cereals), (*Cereals, Government procurement), Flour, Wheat, Food, Animals, Economics, Commerce, Storage, Consumption, Distribution (Economics), Population, Industries, Production, Costs, Statistical data, Transportation, Government (Foreign).

An economic study dealing with that portion of Soviet grain output delivered to the government (up to one-half of annual output is presented. Estimates are made of the allocation of government grain resources among current domestic uses, exports, and stockpiling, in 1940 and all postwar years. The estimates are derived from the open literature available at the beginning of October 1964, and consider data on output of grain products, grain storage capacity, rail shipments of grain, and human consumption of grain and the foods likely to be substituted for it in periods of austerity or abundance (potatoes and livestock products). Government policy with respect to the volume and allocation of procured grain has an immense impact upon the health of the agricultural economy and the living standards of both the farm and nonfarm population. A key element in policy is the attitude toward reserves--the extent to which other objectives are sacrificed to accumulate them, or are served in the short term by running them down. Another element of growing importance is the extent to which the government assumes the responsibility for redistributing grain supply within the agricultural sector. This report attempts to shed light on both of these questions.

AD-608 610 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
PROGRAM BUDGETING: POTENTIAL DIFFICULTIES AND WAYS OF ALLEVIATING THEM,
by R. N. McKean. Oct 64, 22p RM-4310-RC
Unclassified report

Descriptors: (*Federal budgets, Decision making), (*United States government, Federal budgets), Management planning, Economics, Control, Money, Costs.

This memorandum represents one chapter in a forthcoming book, 'Program Budgeting: Program Analysis and the Federal Budget', which is now being written. The book will focus primarily on the major issues involved in determining specific national program goals and the analytical approach necessary to facilitate decisionmaking on these issues. Its purpose is to help improve the understanding, and accelerate the application, of the principles of program budgeting. The objectives in view are: (1) to make the budget a more useful and precise instrument for planning, appropriation, administration, and control within the federal establishment; (2) to contribute to broader public understanding of the allocation and use of federal funds; and (3) to facilitate economic analysis, forecasting, and planning in the private sector.

AD-608 633 Div. 32, 28
OTS Prices: HC $2.00/MF $0.50

Bureau of Social Science Research, Inc., Washington, D. C.
RATIONALISM AND EMPIRICISM IN STUDIES OF BEHAVIOR IN STRESSFUL SITUATIONS,
by Samuel Z. Klausner. Oct 64, 34p
Contract AF49 638 992
AFOSR 64 2256
Unclassified report

Descriptors: (*Social sciences, Scientific research), (*Scientific research, Social sciences), (*Stress (Psychology), Scientific research), Behavior, Social psychology, Stress (Physiology), Attitudes, Scientific personnel, Anxiety, Reports, Personality, Psychophysiology, Sociology.

Every scientific researcher proceeds rationalistically as well as empiricistically. Each may be classified in terms of a tendency to one or the other pole but not in terms of 'either-or'. The literature of the philosophy of science discusses the wisdom of empiricistic or rationalistic approaches. This paper, however, is empirical rather than philosophical. Consequently, it does not discuss the problem of 'wisdom', but rather examines (1) the extent to which empiricistic and rationalistic orientations are found in research reports of a single field, that of human behavior in stressful situations, and (2) the personal and social conditions which are associated with each of these orientations. It is concluded that the tendency to increase the proportion of observation terms among researchers in this group to be empiricistic increases when a researcher is working in a field not his own, when he is a younger professional, when his personality tends to be introverted, when he is a non-Catholic and when he is politically conservative. All of these tend to be characteristics associated with the lack, either actual or by desire, of the attitude labeled (certitude.) A greater proportion of theoretical terms are used as indicators, the rationalistic orientation, in the research reports of individuals working in their own field, when they are older professionals, extroverted, Catholic or politically liberal. These are characteristics associated with enjoying certitude.

AD-608 648 Div. 32
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
A NEW LOOK AT CUSTOMS UNION THEORY,
by C. A. Cooper and B. F. Massell. Nov 64, 9p
P-2972-1
Unclassified report

Descriptors: (*Economics, Commerce), (*Commerce, Theory), Industrial production, Consumption.

In the report the following points are discussed: (1) Analytically the welfare effect of a customs union -- whether trade creating, trade diverting, or both -- can be split into two components: a tariff reduction component, and a pure trade diversion component. (2) The tariff reduction component is the sole source of any gain in consumers' welfare that might result from a customs union. It accounts for both trade creation and the consumption effect. (3) Using as a point of reference an appropriate policy of nonpreferential protection, a customs union necessarily results in pure trade-diversion, and is consequently 'bad' in a welfare sense. (4) The 'free trade point of view' underlying the Vinerian analysis fails to explain why a customs union would ever be preferred to a nonpreferential tariff policy. (5) Recognition of the purposes served by tariffs permits an explanation of the existence of customs unions, and the extension of customs union analysis to a greater variety of issues than has hitherto been the case.

AD-608 704 Div. 32
OTS Prices: HC $1.00/MF $0.50

Center for the Information Sciences, Lehigh Univ., Bethlehem, Pa.
AN EMPIRICAL TESTING PROGRAM FOR MODELS OF INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
Final rept. for 1 Jul 63-60 Jun 64,
by Donald J. Hillman. 6 Nov 64, 12p
Grant AF AFOSR462 64
AFOSR 64 2385
Unclassified report

Descriptors: (*Information retrieval, Mathematical models), (*Mathematical logic, Information retrieval), Programming (Computers), Data storage systems, Special functions (Mathematical), Algebra, Search theory, Algebras, Documentation, Subject indexing, Test methods.

A small scale experimental program was undertaken to compare the efficiency of a retrieval system based on a Boolean model with that of a system based on a negation-free or uncomplemented model. The results of the experiment are described.

AD-608 727 Div. 32, 30, 18
OTS Prices: HC $5.00/MF $1.25

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
COMPUTER PROGRAMMING TECHNIQUES FOR INTELLIGENCE ANALYST APPLICATION.
Quarterly rept. no. 2, 16 Feb-15 May 64.
Oct 64, 182p
Contract AF30 602 3303
RADC TDR64 310
Unclassified report

See also AD-605 267.

Descriptors: (*Programming (Computers), Information

retrieval), (*Information retrieval, Data processing systems), Statistical analysis, Subject indexing, Display systems, Programming languages, Language, Costs, Military intelligence, Analysis.

Modifications were made on the monitor and application programs of the AN/GYA complex. The multi-processing monitor can handle dynamic tape allocation, and it permits updating of the drum-disk library. Additional distribution functions have been programmed for inclusion in STORM and on the AN/GYA disk. A list-processing language has been defined, and is being programmed, which will facilitate inclusion of prototype studies in the lay user's system. Programs have been developed to permit experimental runs for the determination of statistical word association. The clear text system has been augmented by novel encoding features which permit faster search. Pre-processing of an extended data base is under way. A study was prepared proposing the use of an adaptive thesaurus as an experimental tool to quantify properties of indexing systems. (Author) Appendices: Noncentral statistical distribution programs for a computer language, by Rolf E. Bargmann and Sakti P. Ghosh; and Towards design and evaluation of indexing systems for information retrieval, Part 1 and 2, Costs and parameters, by P. Reisner.

AD-608 740 Div. 32
OTS Prices: HC $2.00/MF $0.50

Human Resources Research Office, George Washington Univ., Washington, D. C.
A SELECTED BIBLIOGRAPHY OF CROSS-CULTURAL CHANGE PROJECTS.
Research memo.,
by Arthur H. Niehoff and J. Charnel Anderson. Oct 64, 34p
Contract DA44 188ARO 2, Task CIVIC
Unclassified report

Descriptors: (*Foreign aid, Bibliographies), (*Culture, Foreign aid), Agriculture, Social sciences, Public health, Education, Africa, Europe, South America, Asia, Pacific Ocean islands.

The case histories listed in this bibliography were originally selected for the purpose of developing a system for analyzing the process of directed cross-cultural change. In confining this selection of case histories to efforts of introducing ideas or techniques into another society, the normal range of technical aid projects was included, such as community development, agricultural extension, education, public health, and so forth. Most of the cases are identified as one of six basic project types, but there are a few, such as resettlement cases and organization of clubs, that do not readily fit into these categories. They are labelled as miscellaneous. Also, there are some cases that are a combination of two or more of the six types. For example, wells may be drilled both for drinking water and irrigation. These cases are identified by each relevant project type. The primary grouping of the cases is by country or political unit in alphabetic order (Angola to Venezuela). Under each country they are grouped according to basic project type, then alphabetically by author. Each citation is followed by a statement of the goal of the innovator and, when available, the size and time period of the project.

AD-608 743 Div. 32
OTS Prices: HC $1.00/MF $0.50

Herner and Co., Washington, D. C.
A CASE STUDY IN THE APPLICATION OF CRANFIELD SYSTEM EVALUATION TECHNIQUES,
by Saul Herner, F. W. Lancaster, and Walter F. Johanningsmeier. 1964, 14p
Contracts NObs88417, AF49 638 1182
AFOSR 64 2259
Unclassified report

Delivered at the 148th meeting, American Chemical Society, Chicago, 30 Aug-4 Sep 64.

Descriptors: (*Information retrieval, Effectiveness), Documentation, Digital computers, Subject indexing, Errors.

An account is given of a project performed on behalf of the U.S. Navy Bureau of Ships Technical Library to evaluate the effectiveness of a computerized information retrieval system based on the Engineers Joint Council system of role indicators and links. The evaluation method used was that developed by Cleverdon in the ASLIB Cranfield Project. The search program involved all major combinations of appropriate descriptors and role indicators. Once the searches were performed, the documents produced were submitted to compilers of the original questions. A basis was obtained for computation of relevance ratios. Recall ratios were determined by actually doing a total check of the specimen collection to locate all documents that had any possible relevance to 10 of the test questions. The greatest cause of noise in the search results was searching errors, and the most frequently occuring type of searching error was the failure to select crucial terms or concepts in translating the questions into the language of the system. The question was different on analysis for reasons for failure to retrieve documents that were relevant to search questions. Here, indexing errors contributed more heavily to the cause of failure.

AD-608 747 Div. 32, 30
OTS Prices: HC $4.00/MF $1.00

Indiana Univ., Blomington.
LINGUISTIC TRANSFORMATIONAL ANALYSIS.
Final rept. for 1 Jan-31 Dec 63,
by J. P. Thorne and J. Lyons. Oct 64, 125p
Contract AF30 602 2951, Grant NSF GS108,
Proj. 4594, Task 459401
RADC TDR64 200
Unclassified report

Descriptors: (*Language, Analysis), (*Information retrieval, Language), Syntax, Programming (Computers), Vocabulary.

The contract was concerned with the feasibility and utility of a 'kernelization' procedure for purposes of information retrieval. The leading section discusses, in general, the problems involved in the kernelization of complex English sentences; this section is the work of J. P. Thorne. The remainder is in the form of appendices. Appendix I contains a detailed report of the kernelization procedure; for this section S. I. Laszlo was largely responsible. Appendix II reports on a series of experiments, undertaken by J. Masters, to determine to what extent 'information' was 'preserved' in kernelized versions of sentences. Appendix III reports on a frequency count of the transformations exhibited by a stretch of running text; this count was undertaken by F. C. Fisher, W. J. Kunz, T. Matsuda and (initially) H. Feider. Finally, Appendix IV contains a list of transformational rules which have actually been written, with reference to significant published (and some unpublished) material. This list was prepared by T. Matsuda. (Author)

AD-608 774 Div. 32, 30
OTS Prices: HC $1.00/MF $0.50

Air Force Office of Scientific Research, Washington, D. C.

INFORMATION TECHNOLOGY AND THE INFORMATION SCIENCES, 'WITH FORKS AND HOPE',
by Harold Wooster. 1 Nov 64, 21p
Proj. 9769
AFOSR 64 1897

Unclassified report

Talk given at the Conference on Electronic Information Handling, Pittsburgh, Pennsylvania, on 9 Oct 1964. To be published in the Proceedings of that Conference.

Descriptors: (*Data processing systems, Scientific research), Information retrieval, Pattern recognition, Artificial intelligence, Programming (Computers), Computers, Documentation.

Electronic information handling is a rapidly developing technology. It is parasitic upon, host to, and symbiotic with many other technologies. Like all other technologies, it is presumably dependent upon a body of fundamental scientific disciplines and knowledge. Advances in information technology can only come in three ways: by specific R and D efforts in information handling per se; by exploiting fortuitous advances in ancillary technologies; and, by improvements in fundamental understanding. The emphasis of the paper is on the last of these, with emphasis on epistemology, intelligent automata, pattern recognition from visual to semantic, self-organization, and computer organization and programming. (Author)

AD-608 835 Div. 32
OTS Prices: HC $2.00/MF $0.50

RAND Corp., Santa Monica, Calif.
NATIONAL INCOME AND WELFARE,
by Abram Bergson. Oct 64, 30p P-3004

Unclassified report

Prepared in cooperation with Harvard Univ., Cambridge, Mass.

Descriptors: (*Economics, Decision making), (*Management planning, United States Government), (*Statistical data, Economics), Distribution (Economics), Money, History, Consumption.

In order to appraise from the standpoint of a community's welfare a governmental measure with wide impact, the economist may proceed variously, but almost inevitably he refers to national income data. How such data are to be construed in the appraisal, however, is now the subject of a sizable and often controversial literature. This essay reviews briefly this important theme. (Author)

33. Transportation

No Entries

How To Use New Indexes To TAB Portion Of

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS

CORPORATE AUTHOR-MONITORING AGENCY INDEX

The Corporate Author-Monitoring Agency Index is arranged alphabetically by corporate authors and monitoring agencies.

In the corporate author entry (designated by an asterisk) for each document are listed the originator of the report, the originator's report number, the title, AD number, and division number. If the source has listed a monitoring agency in the report, the monitor acronym and monitor series number are given in parantheses directly under the title. An IDEP (Interservice Data Exchange Program) report number is presented in the same way. A typical corporate author entry is shown below.

*SHEFFIELD UNIV (ENGLAND)
* * *
HIC 45
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
(AFOSR 64 2029)
AD-608 206 DIV. 25

The three asterisks serve as a separator between entries for reports under the same corporate author.

When a report lists a monitoring agency, a corresponding entry is provided under the name of the monitoring agency, which appears in alphabetical order among the corporate author entries. In a monitoring agency entry, the report number is given above the title in place of the originator's report number. A typical monitoring agency entry is shown below.

*AIR FORCE OFFICE OF SCIENTIFIC RESEARCH WASHINGTON D C
* * *
64 2029
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
AD-608 206 DIV. 25

SUBJECT INDEX

The Subject Index is arranged alphabetically by asterisked descriptors from the document announcements in the TAB. Each announcement contains one or more asterisked descriptors which identify the main subjects of the report. The asterisked descriptor may or may not have a modifying descriptor appearing directly below the asterisked descriptor. Under each descriptor entry in the Subject Index appear the following items of information: annotation, AD number, and division number. A typical subject index entry is shown on the next page.

*COMBUSTION
OSCILLATION
INTENTIONAL COMBUSTION
OSCILLATIONS IN PROPULSION
SYSTEMS
AD-608 206 DIV. 25

PERSONAL AUTHOR INDEX

The Personal Author Index is arranged alphabetically by the last names of the authors of reports. When several report entries are given for one author, the entries are arranged numerically by AD number. Division numbers and titles are also listed. Again, three asterisks serve as a separator between entries for reports under the same author. A typical personal author entry is shown below.

*BENDAT, JULIUS S.
* * *
ZERO CROSSINGS OF A SINE
WAVE PLUS RANDOM NOISE
AD-608 019 DIV. 15
* * *
SPECTRA AND AUTOCORRELATION
FUNCTIONS FOR FULLY DEVELOPED
SEAS AND PREDICTION OF STRUCTURAL
FATIGUE DAMAGE
AD-608 464 DIV. 2

CONTRACT INDEX

The Contract index is arranged alphanumerically by contract number. Within a contract grouping, each entry contains corporate author, series number (if any), monitor number (if any), AD number, and division number.

When there are multiple document entries under one contract number, entries are arranged by AD number under each corporate author represented.

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•AF33 657 11018
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•AF33 657 11181
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•AF33 657 11297
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•AF33 657 11677
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ESL FR 216
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•AF33 657 7027
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•AF33 657 7442
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•AF33 657 7486
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•AF33 657 8294
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•AF33 657 8367
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•AF33 657 9826
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•AF49 638 1271
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•DA04 495ORD3245
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OTHER RESEARCH REPORTS AND RELATED MATERIAL

*Descriptors marked with an asterisk are included in the subject index.

1. Aircraft and Flight Equipment

Patent 3,140,483 Div. 1, 6

BAROMETRIC-RADAR ALTITUDE CONTROL SYSTEM.
Navy-assigned Patent,
by Stephen J. Sikora and Harry J. Campbell.
7 Jul 64,
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight control systems), (*Flight control systems, Height finding), Flight instruments, Barometers, Radar equipment, Automatic pilots.

The altitude sensing system is for use with automatic steering systems for aircraft or with altimeters. The system incorporates the advantages of radar and barometric pressure altitude sensing devices. (Author)

Patent 3,143,321 Div. 1,12

FRANGIBLE TUBE ENERGY DISSIPATION.
NASA-assigned Patent,
by John R. McGhehee, Melvin E. Hathaway, and Edmond J. Zavada. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vibration isolators), (*Vibration isolators, Aerospace craft), Landing gear, Pipes, Brittleness, Energy, Transport properties.

Shock absorber assemblies are associated with the landing gear system of an aerial vehicle to enable landing of the vehicle on the earth's surface after returning from a space flight. Frangible tubular members are longitudinally disposed in relation to the moving vehicle. (Author)

Patent 3,143,734 Div. 1

SPEED INDICATOR.
Air Force-assigned Patent,
by Herbert P. Raabe. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight speed indicators), (*Flight speed indicators, Design), Aircraft antennas, Flight instruments, Velocity, Configuration, Signals.

Apparatus is provided on an aircraft for continuously indicating the magnitude and direction of the velocity vector of the aircraft. The aircraft is provided with three equally spaced antennas arranged in a straight line on the underside of the aircraft and rotatable about a verticle axis. The center antenna is the transmitting antenna and the other two receive the reflected signals.

Patent 3,145,298 Div. 1, 30

SECANT FUNCTION GENERATOR.
Navy-assigned Patent,
by Glenn B. Shoemaker. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Navigation computers), (*Navigation computers, Aircraft), Display systems, Airborne, Aircraft equipment.

The longitude-latitude computer and display system is for computing and indicating the position of an aircraft in flight. A unique arrangement is utilized for incorporating or compensating for meridian convergence. The system accurately compensates for meridian convergence between latitudes 85 degrees S. and 85 degrees N. and at speeds as high as 1200 knots.

Patent 3,145,951 Div. 1, 31

BRIDLE AND PENDANT ARRESTMENT DEFLECTOR.
Navy-assigned Patent,
by Edward A. Ambrosano. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Catapults), (*Catapults, Flight decks), Aircraft, Launching, Ship decks, Arresting gear, Surfaces, Deflection.

The aircraft launching shuttle for a landing surface such as the deck of the ship includes a carriage, a hook secured to the carriage and adapted to extend above the landing surface and a deflector secured to the hook. The device prevents the bridle snagging on the shuttle equipment.

Patent 3,145,952 Div. 1, 31

BRIDLE AND PENDANT ARRESTMENT DEFLECTOR.
Navy-assigned Patent,
by Edward A. Ambrosano. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Catapults), (*Catapults, Flight decks), Aircraft, Launching, Arresting gear, Ship decks, Surfaces, Hooks, Deflection.

The aircraft launching surface, such as a ship's deck, has a launch track and a shuttle hook extending from the track above the deck. Provisions are made for guiding a bridle over the hook including a ramp hingedly secured to the deck and adapted to be raised at one end to the top of the hook while the hook is stationary adjacent the ramp and the bridle is retracted over it.

Patent 3,145,956 Div. 1

PARACHUTE DEPLOYMENT CONTROL ASSEMBLY.
AEC-assigned Patent,
by Harold E. Widdows. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Parachutes), (*Parachutes, Control systems), Packs (Parachutes).

The control assembly reduces damage to a parachute under high-speed deployment. In the arrangement disclosed, the line compartment lacings are cut at the start of deployment and the canopy compartment remains laced until the line stretch which occurs just prior to unlocking the pack locking flaps. The lacings for the canopy compartment are cut when the suspension lines are fully extended by lanyards connected to the suspension lines and attached to the canopy compartment lace cutting knives.

Patent 3,146,971 Div. 1

HYPERSONIC AIRCRAFT.
Navy-assigned Patent,
by James H. Walker and Gene J. Pietrangeli.
1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hypersonic planes), Fuselages, Wings, Turbojet engines, Take-off, Landings, Ramjet engines, Flight.

The aircraft has a fuselage with a pair of wings attached to it and a fin mounted on each wing. Four turbojet engines are used during take-off and landing. A pair of ramjet engines are used during flight.

Patent Design 199,104 Div. 1

SUPERSONIC AIRCRAFT.
NASA-assigned Patent,
by William C. Sleeman, Jr. 8 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Supersonic planes), (*Supersonic planes, Design), Aerodynamic configurations, Supersonic flight, Aircraft.

The aircraft is designed for supersonic flight. The pointed, cone-like fuselage has wing surfaces flowing outwardly and rearwardly from the center of the fuselage. Control surfaces are attached to the wings. The engines are positioned under the fuselage.

2. Astronomy, Geophysics and Geography

Patent 3,140,969 Div. 2, 14

GEL-ADHERED STREAMLINED BALLOON AND METHOD OF MANUFACTURE.
Army-assigned Patent,
by Moses B. Sarenow. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Meteorological balloons), (*Meteorological balloons, Manufacturing methods), Adhesion, Joining, Gels, Weight, Protective coverings.

The fast rising meteorological balloon is made generally in the manner of the prior art. Prior to joining the two balloons, one-third of one of the balloons is masked out while in the wet gel state by a masking cap to prevent adherence of all of the balloon to its adjacent balloon except for a narrow adhering zone. The unadhered part is cut away after curing. This reduces the weight of the balloon.

Patent 3,146,622 Div. 2,30

ATMOSPHERIC EDDY DISTURBANCE DETECTOR.
AEC-assigned Patent,
by Harry Moses. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Atmospheric sounding), (*Atmospheric motion, Monitors), Atmospheric temperature, Infrared scanning, Infrared equipment, Thermal properties, Tapes, Wire, Design.

The device is for measuring isotach patterns in the atmosphere in either a vertical or horizontal plane. A tape or heated wire is suspended in the atmosphere. An infrared detector is adapted to scan the tape or wire periodically and to detect thermal changes on it. An arrangement is shown for reading the output from the detector whereby a two dimensional pattern of isotachs or isotherms in a plane may be constructed.

3. Chemical Warfare Equipment and Materials

CAPE-914 Div. 3

Lawrence Radiation Lab., Univ. of California,
Berkeley.
CARBON-14 ISOTOPE SEPARATOR.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Carbon, Isotope separation), (*Isotope separation, Carbon), Mass spectroscopy, Spectrum analyzers, Specifications, Tracer studies.

The isotope separator is a single-direction focusing spectrometer with a 90-degree sector magnet of 15 cm nominal radius of curvature. It is designed for the irradiation of solid samples with ions produced by gas discharge. The source gas is bled into the ionization source and ions are produced, extracted, and focused on a slit. Ions then enter the magnetic field, where they are separated, and the desired ions are allowed to pass though an exit slit and impinge upon the target material. The machine is used to study the C14-ion irradiation of benzene to determine the chemical fate of the energetic radiocarbon species and the interactions of the energetic particle with its surroundings that led to that fate. Thirty-seven drawings are included. (AEC abstract)

Patent 3,143,070 Div. 3, 22

SAFE BIOLOGICAL OR CHEMICAL WARFARE PROJECTILE.
Navy-assigned Patent,
by Gilbert C. Bowen. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Projectiles), (*Chemical projectiles, Patents), (*Biological warfare agents, Projectiles), Bombs, Grenades, Rockets, Fragmentation, Safety devices, Containers.

The biological or chemical warfare projectile may be in the form of a bomb, a hand grenade, a rocket or the like. The projectile has an outer container carrying the noxious agent. A neutralizer fills the space between the inner and outer containers. The agent is neutralized when an incomplete fragmentation of the outer container occurs and the inner container is ruptured.

4. Chemistry

CAPE-1045 Div. 4, 8, 25, 30

Lawrence Radiation Lab., Univ. of California, Livermore.
MOLECULAR BEAM REACTIVE SCATTER APPARATUS.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Crossed field devices, Mechanical drawings), (*Molecular beams, Crossed field devices), Chemical reactions, Scattering, Laboratory equipment, Design.

Drawings (35) are included for a crossed molecular beam apparatus for use in the study of chemical reactions. (AEC abstract)

CAPE-1105 Div. 4, 26

Rocky Flats Div., Dow Chemical Co., Golden, Colo.
DISSOLVER POT.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Plutonium, Recovery), (*Industrial equipment, Plutonium), Separation, Processing, Manufacturing methods, Heat-resistant glass, Pipes.

This simple device is used for the dissolution of plutonium skulls. The pot is made from Pyrex pipe 6 in. ID and 12 in. long. Each end is sealed by a flanged-plate lid made of stainless steel and T elbow, and is fastened with swing bolts. The bottom lid assembly is perforated and provides for a reservoir and filter, both made of Teflon. For a title listing, see the Engineering Materials List (TID-4100). (AEC abstract)

Patent 3,140,990 Div. 4, 10, 16

METHOD OF PREPARATION OF OZONE.
Army-assigned Patent,
by James W. Edwards and Joseph S. Hashman.
14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ozone), (*Ozone, Synthesis (Chemistry)), Fuels, Germicides, Alcohols, Carbon compounds, Monoxides, Electric discharges.

Ozone is used in missile fuels and bactericides. Carbon monoxide is formed with the ozone in this process and is useful in the chemical synthesis of methanol and in fuels. The ozone and carbon monoxide are obtained from a carbon dioxide source which is subjected to an electrical discharge. The products of the discharge are rapidly passed through a phosphoric acid coated channel and into a cold trap at between 4 and 77 degrees K. The products are recovered.

Patent 3,143,447 Div. 4, 7, 25

CHEMICAL ETCHES FOR LEAD TELLURIDE CRYSTALS.
Navy-assigned Patent,
by Marriner K. Norr. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Etched crystals), (*Etched crystals, Patents), (*Lead compounds, Tellurides), Hydroxides, Iodates, Crystals, Semiconductors, Thermoelectricity, Refrigeration systems.

The solution for etching lead telluride crystals consists essentially of hydroxyl ions and about 0.2 to 2 percent by weight of iodate ion. The crystals are useful semiconductor materials and are used in thermoelectric generators and refrigerators.

Patent 3,143,562 Div. 4

PREPARATION OF AROMATIC PEROXY ACIDS.
Agriculture-assigned Patent,
by Leonard S. Silbert and Daniel Swern. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Aromatic compounds), (*Aromatic compounds, Acids), Benzoates, Peroxides, Synthesis (Chemistry), Sulfonates.

Peroxybenzoic acid and other aromatic peroxy acids are prepared by the reaction of the aromatic acid or its ester with hydrogen peroxide using methanesulfonic acid as the solvent and reaction medium. The acids are used in the epoxidation and hydroxylation of olefins, the conversion of sulfides to sulfoxides and sulfones, and the oxidation of tertiary amines to amine oxides.

Patent 3,144,484 Div. 4,16

CHROMOGENIC SUBSTRATE FOR USE IN ASSAYING ENZYMIC ACTIVITY.
Navy-assigned Patent,
by Bernard F. Erlanger. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Chemical indicators), (*Chemical indicators, Enzymes), (*Enzymes, Chemical indicators), Hydrolases, Trypsin, Colorimetric analysis, Amino acids, Bromides, Reaction kinetics, Quantitative analysis.

L-lysine p-nitroanilide dihydrobromide is claimed. This product, due to its activity and indicator-like properties, i.e. the release of color upon hydrolysis, is ideal for detection, kinetic studies and quantitative determinations of trypsin and trypsin-like enzymes in biological systems.

Patent 3,146,227 Div. 4

SYNTHESIS OF MUSTARD OIL GLUCOSIDES.
Army-assigned Patent,
by Martin G. Ettlinger and George P. Dateo, Jr.
25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Glycosides), (*Glycosides, Synthesis (Chemistry)), Oils, Sulfonates, Potassium compounds.

The hydroxamyl chloride-O-sulfonates are useful as intermediates in the process for the synthesis of mustard oil glucosides. A product claimed is potassium acetohydroxamyl chloride-O-sulfonate.

5. Communications

Patent 3,141,067 Div. 5

AUTOMATIC ELECTRONIC COMMUNICATION SWITCHING EXCHANGE.
Army-assigned Patent,
by Lester M. Spandorfer. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Switching circuits), (*Switching circuits, Electronic equipment), Networks, Telephone communication systems, Communication systems, Automatic.

The switching exchanges are used in telephone and other communication systems. The switching exchange includes a switching matrix of network utilizing electronic devices, for connecting together in communication relation various pairs of subscribers on demand of one or more of them, and to maintain or 'hold' the connections as long as desired by the subscribers involved.

Patent 3,146,447 Div. 5

COMMUNICATION SYSTEM.
Army-assigned Patent,
by Harold L. Newman. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Radio communication systems), (*Radio communication systems, Radio equipment), Wave transmission, Power, Radio waves, Antennas, Phase angle, Polarization, Measurement.

The apparatus effects the maximum power transfer between the antennas in a radio communication system. A system is disclosed for extracting the orthogonal components from a received elliptically polarized wave, measuring the phase angle between these components, the axial ratio, sense of rotation and orientation angle by utilizing the magnitudes or absolute values of the orthogonal components only. This information is then used to automatically generate a transmitted wave of matching polarization.

6. Detection

Patent 3,141,073 Div. 6

HIGH SPEED ROTARY SWITCH WITH CONTACT CLEANING MEANS.
Navy-assigned Patent,
by Arthur C. Stocker, Frank Wendzel, William Rolke, and Karl G. Kaufmann. 14 Jul 64,
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rotary switches), (*Rotary switches, Telemeter systems), Impellers, Brushes, Velocity, Air, Gas flow, Slip rings.

The rotary switch is designed for use at speeds on the order of 1800 r.p.m., in a telemetering system. A disadvantage of prior switches has been the build-up of a carbon film on the contacts. Components of the switch include an air current generating rotor, brushes, switch contacts and a collecting slip ring.

Patent 3,141,084 Div. 6

WEIGHTLESSNESS SWITCH.
AEC-assigned Patent,
by Robert P. Stromberg. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric switches), (*Electric switches, Telemeter systems), Liquids, Electrical conductance, Operation, Weight, Surface tension, Geometric forms.

The switch is designed for use in the telemetering field, particularly in the space technology area. A high-density conducting liquid is utilized within a switch containing cavity so that when the switch approaches weightlessness the shape of the conducting liquid changes due to surface tension to close the switch.

Patent 3,141,098 Div. 6, 8

HIGH SPEED ELECTRONIC SWITCHING CIRUCIT.
Navy-assigned Patent,
by Peter Ravenhill and Harold Smith. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Switching circuits), (*Switching circuits, Radar equipment), (*Radar equipment, Switching circuits), Signals, Gates (Circuits), Voltage, Diodes (Semiconductor), Coils.

The high speed electronic switching circuit is utilized in a radar system. It is operable by positive and

negative voltage signals applied to an external gate. The circuit components include inputs, outputs, first and second crystal diodes, a gating terminal, a third crystal diode and two chokes.

Patent 3,143,735 Div. 6, 30

HEIGHT COMPUTER.
Air Force-assigned Patent,
by George E. Martin. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Target position indicators), (*Computers, Height finding), (*Height finding, Targets), Triodes, Circuits, Video signals, Electric currents, Control.

The device is for determining the height of a target. Height computation is accomplished by providing pentagrid converters in the detector circuits and by applying the video signal to the first grid and the range voltage to the second grid of the pentagrid converters. The pentagrid converters function as two triodes where both the receiver output voltage and the range voltage control the amount of current flowing in the second triode section.

Patent 3,144,848 Div. 6, 31

LIGHTWEIGHT TOWED TRANSDUCER HOUSING.
Navy-assigned Patent,
by Sidney T. Knott and Warren E. Witzell. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Towed sonar), (*Towed sonar, Containers), Towed bodies, Underwater sound generator, Transducers, Echo ranging.

The echo-sounder transducer enclosure has a low self-generated noise characteristic. It can be handled from small vessels. The towed vehicle structure includes a teardrop shaped housing, a tail pipe attached to the housing, and an adjustable, cylindrical ring tail.

Patent 3,145,365 Div. 6, 31

ACOUSTIC WATER PATH SIMULATOR.
Navy-assigned Patent,
by Richard K. Jacobs. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sonar), (*Underwater sound, Simulators), (*Acoustic equipment, Submarines), Sonar, Test equipment.

The apparatus is for simulating an acoustic water path in the test of sonar equipment when its transmitting and receiving posts are not submerged in water. The sonar equipment is used aboard a submarine. The apparatus includes a fixture for securing a transducer to a pressure sensitive portion of either post of the transmitting and receiving elements.

Patent 3,145,378 Div. 6

RETRACE INSERTION SYSTEM.
Navy-assigned Patent,
by William F. Lyons, Jr. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Television display systems), Cathode ray tubes, Targets, Beacons, Identification systems, Visual signals, Radar tracking, Indicator lights.

The retrace insertion system is for use with a cathode ray tube indicator, for example, of the plan position type, whereby a variety of markers or symbols may be displayed on the indicator conjointly with target, beacon, or other displays for identification or plotting purposes. The system may be used with a typical radar indicating system.

7. Electrical Equipment

CAPE-638 Div. 7

Lawrence Radiation Lab., Univ. of California,
Livermore.
IGNITRON PULSE TRANSFORMER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Electromagnetic pulses, Transformers), (*Transformers, Specifications), Electric discharges, Capacitors, Voltage, Electric currents, Electrodes, Circuits, Discharge tubes, Mechanical drawings.

The transformer is designed to couple the firing pulse to the igniter of an ignitron, which is used as the main discharge switch for a high voltage capacitor bank. The transformer provides polarity reversal and high voltage isolation between the firing pulse source and the igniter. The signal has a pulse amplitude of 3 kv, 3 to 5 microsec duration, and negative polarity. The output signal to the igniter is identical to the input signal because the transformer ratio is unity; however, the polarity is reversed to apply a positive pulse to the igniter. The transformer provides 20 kv isolation between the primary and secondary circuits and will handle peak pulse currents of 100 amps. The primary circuit of the transformer is provided with two spark plug protectors to divert possible fault currents to ground in the event of primary to secondary insulation failures. Nine drawings are included. (AEC abstract)

CAPE-1057 Div. 7

California Univ., Berkeley.
TRIGGERED NANOSECOND LIGHT SOURCE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Glow lamps, Mechanical drawings), Lighting equipment, Scintillation counters, Pulse generators, Electromagnetic pulses, Transformers, Wiring diagrams, Specifications.

Thirty-five drawings are included. The nanosecond light source, which is based on a corona discharge started by field emission, is an attachment for scintillation counters. Individual light sources, placed to illuminate each phototube and fired by a pulse generator through splitting transformers and cable delays, facilitate the coincidence timing of an array of photomultiplier detectors. The system consists of a pulse generator, pulse splitting transformers, cable delays, and

individual light sources. The electrical pulses are generated by switching a charged coaxial cable into an output transmission line of matched impedance of 51 ohms. A mercury capsule in a constant-impedance oil-filled enclosure is the switch. The input and output impedances of the splitting transformer are 51 ohms. Four equal and synchronous outputs are provided at just half the input voltage. One transformer feeds four others to produce 16 identical signals at one fourth the voltage level of the primary pulse generator. (AEC Abstract)

Patent 3,140,455 Div. 7

STRIPLINE VARIABLE POWER DIVIDER.
Navy-assigned Patent,
by John A. Geikler, Jr. and Tommy S. Weaver.
7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Power dividers), (*Power dividers, Design), Electrical equipment, Waveguides, Circuits, Electric connectors.

The power divider divides the total power of an input source into any proportion to be delivered to two outputs. It is useful in the waveguide art. The device is made up of three layers of stripline board, the bottom layer of which contains a circuit. This circuit on the bottom layer is comprised of a first conductive area that is connected to an input connector and to one output connector, and a second conductive area that is connected to a second output connector. Each conductive area has a tapered portion. The tapered portion on the first conductive area is contiguous to the tapered portion on the second conductive area but separated by a narrow gap. (Author)

Patent 3,143,440 Div. 7, 4

FUEL CELL.
Army-assigned Patent,
by Herbert Hunger and James E. Wynn. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fuel cells), (*Fuel cells, Patents), Energy conversion, Fuels, Electrolytes, Membranes, Electrodes, Formaldehyde, Potassium compounds, Hydroxides, Formates, Alcohols.

The fuel cell is for the direct production of electrical energy from a liquid fuel. The electrolyte is a solvated anion exchange membrane which is positioned between two gas permeable porous electrodes. The liquid fuel consists of exothermic reaction products of an aqueous solution of formaldehyde containing about 37 percent of formaldehyde with an aqueous solution of potassium hydroxide. The mixture after cooling consists of a mixture of methanol, formaldehyde and potassium formate.

Patent 3,145,284 Div. 7

SUPERCONDUCTIVE ELECTRIC SWITCH.
AEC-assigned Patent,
by Henry L. Laquer. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric switches), (*Electric switches, Superconductors), (*Superconductors, Electric switches), Circuits, Helium, Liquefied gases, Cryostats, Containers, Hermetic seals, Niobium alloys, Tin alloys.

The switch is utilized with superconducting circuitry. The switch along with related circuitry is submerged in a coolant, preferably liquid helium, in a cryostat. The switch comprises a conductor preferably made of Nb3Sn. A shell-like container surrounds part of the conductor and is hermetically sealed with it.

Patent 3,146,050 Div. 7, 5

PATCHING PANELS FOR ELECTRICAL INTERCONNECTIONS.
Air Force-assigned Patent,
by Frank Kozien, Alfred F. Smith, John A. Thompsen, and Royden F. Allen. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Pannel boards (Electricity)), (*Pannel boards (Electricity), Electric connectors), Communication equipment, Electric terminals.

The panel is used in a communication central having circuits to the subscribers being served by the central. The panel includes a number of conductor mounting and housing elements. The elements cooperate or interlock with each other to furnish a unitary assembly.

Patent 3, 147,422 Div. 7, 8

ELECTRONIC MOTOR CONTROL SYSTEM.
NASA-assigned Patent,
by Thomas N. Harrison. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electric motors), (*Electric motors, Control systems), (*Control systems, Electronic equipment), Current regulators, Alternating current, Thyratrons.

The motor to be controlled is powered by two energizing circuits. Each of the circuits consists of an A.C. supply connected in series through a current control, such as a thyratron tube, to the motor. One of the energizing circuits provides a driving power for the motor at a speed determined by its current control element and the other energizing circuit provides electrical breaking power to the motor of a magnitude determined by its current control element. Both circuits are controlled by a control signal.

Patent 3,147,443 Div. 7

RECOGNITION SYSTEM.
Navy-assigned Patent,
by Henry L. Mason and Julius H. Wright. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Voltmeters), (*Voltage, Monitors), (*Monitors, Voltage), Measuring devices, (Electrical and electronic), Voltage regulators.

The system employs direct logic for the recognition of voltage level peaks. The peak recognition system employs a plurality of sensors each of which is sensitive to a particular level of signal voltage. The input variable

voltage represents the change of a condition which may be a type of movement, a temperature change or other condition which it is designed to monitor.

Patent 3,149,294 Div. 7

DUAL INPUT PARALLEL T NETWORK.
Navy-assigned Patent,
by John E. Abel. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Electrical networks), (*Electrical networks, Phase control devices), Attenuation, Frequency, Capacitors.

A dual input, variable parallel T network is provided in which notch attenuation remains constant as a function of frequency which is determined by control setting. A phase correction capacitor is added to a conventional network.

8. Electronics and Electronic Equipment

CAPE-1116 Div. 8

Brookhaven National Lab., Upton, N. Y.
Mc DECADE SCALER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Scalers, Mechanical drawings), Circuits, Counting methods, Electronic equipment, Mechanical drawings, Specifications.

Five drawings are included. The 100 Mc decade scaler is a new version of the 100 Mc scaler. It is much more reliable than previous models and divides by 10 instead of by 8. This package contains schematic drawings for the scaler, rate meter, and readout device. (AEC abstract)

Patent 3,140,447 Div. 8

INPUT SIGNAL CONTROLLED REGENERATIVE FREQUENCY DIVIDERS.
Navy-assigned Patent,
by John E. Olbrych and Sholly Kagan. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frequency dividers), (*Frequency dividers, Design), Circuits, Mixers (Electronic), Tuned circuits, Filters (Electromagnetic waves), Q band, Frequency multipliers, Signals, Control systems.

The basis components of the frequency divider circuit include a mixer input stage, two filters which are high Q tuned circuits, a frequency multiplier stage, and input and output leads. The device is non regenerative. (Author)

Patent 3,140,478 Div. 8

SATURABLE TRANSFORMER ENCODER.
Navy-assigned Patent,
by George F. Marette, Berc I. Parsegyan, and Abraham Franck. 7 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Saturable reactors), (*Saturable reactors, Pulse generators), (*Pulse generators, Saturable reactors), Coding, Electromagnetic pulses, Magnetic materials, Coatings, Communication theory.

The apparatus is for generating and propagating a series of logical pulses by the use of magnetic film elements. Each film has a plurality of windings or wires to control the magnetic states of the films. By controlling the states of the individual films, one can generate a series of pulses on each of the film output wires, and thereby create a logical code or pulse group as desired. (Author).

Patent 3,143,668 Div. 8

POWER SAVING SWITCH DRIVER SYSTEM.
Navy-assigned Patent,
by Loy H. Bloodworth and Kenneth E. Wood.
4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amplifiers), (*Electronic switches, Design), Switching circuits, Coils, Rods, Diodes (Semiconductor), Voltage.

The power saving driver system is for driving a binary switching system. Each driver consists basically of a P-N-P power switch and a plurality of switching coils connected in series with each collector and a common bus bar. The common bus bar is connected through a crystal diode to a source of low voltage and also through an electronic switch to a source of high voltage.

Patent 3,143,669 Div. 8, 25

HIGH FREQUENCY TRANSISTOR BISTABLE MULTIVIBRATOR.
Navy-assigned Patent,
by Joseph J. Gavern and Frank H. Heissenbuttel, III.
4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Relaxation oscillators), (*Relaxation oscillators, Transistors), High frequency, Switching circuits, Computer logic, Digital computers.

The transistor multivibrator device has appplication in switching and digital logic circuitry. The circuit utilizes emitter follower action to reduce the time constant of the input circuit thereof to a small fraction of its usual value in circuitry of the prior art, to enable faster transistion time.

Patent 3,143,709 Div. 8, 12

BROAD BAND FREQUENCY MULTIPLIER AND MIXER.
Army-assigned Patent,
by Kenneth H. Patterson. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frequency multipliers), (*Frequency multipliers, Broadband), (*Mixers (Electronic), Frequency meters), Doppler systems, Frequency, Circuits, Satellites (Artificial), Filters (Electromagnetic wave).

The circuit is for measuring dispersive Doppler. The signal source is carried on a satellite. The frequency measuring system includes a pair of input signals, a gain control circuit, a tracking filter, a pair of tank circuits, a final mixer and an output.

Patent 3,143,737 Div. 8

FOLDED S-SHAPED DIPOLE ANTENNA.
Navy-assigned Patent,
by Virginia T. Norwood. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Dipole antennas), (*Dipole antennas, Antenna configurations), Antenna feeds, Electromagnetic waves, Polarization, Wire.

The radiating antenna is of the folded dipole type and has an S-construction. It is capable of being fed by a balanced open-wire line lying in the plane of polarization of the radiated power.

Patent 3,144,622 Div. 8

VOLTAGE VARIABLE OSCILLATOR.
Army-assigned Patent,
by James S. Thorp. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Oscillators), (*Oscillators, Voltage), Amplifiers, Delay lines, Gain, Frequency, Operation.

The oscillator comprises a plurality of amplifiers. Its frequency is determined by a variable delay line. Several delay lines are connected in series and several variable gain amplifiers are connected between the input to the delay lines. An electrical control is provided to gradually increase and decrease the gain of the amplifiers successively to gradually increase the amount of delay from the input through the delay lines and back to the input.

Patent 3,145,299 Div. 8

WAVEMETER.
Navy-assigned Patent,
by Cullen M. Crain and Charles E. Williams.
18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Frequency meters), (*Frequency meters, Specifications), Measuring devices (Electrical and Electronic), Sensitivity, Design.

The tunable wavemeter is sensitive to extremely small frequency changes and is independent of atmospheric moisture and pressure conditions. The structure is such that all sealing parts of the sealed structure are stationary. The plunger forms no part of the sealing structure. It can be replaced with one of different diameter without requiring unsealing of the resonator. (Author)

Patent 3,145,345 Div. 8

TRANSISTOR LINEAR PEAK DETECTOR FOR SIGNALS HAVING WIDE DYNAMIC RANGE.
Navy-assigned Patent,
by Jerome C. Squillaro and Henry D. Tolj. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Demodulators), (*Transistors, Demodulators), (*Demodulators, Transistors), Transistor amplifiers, Capacitors, Resistors, Diodes, Gain, Signals, Circuits.

The transistor linear peak detecting circuit has a negative feedback for varying the detector amplifier gain inversely proportional to input signal amplitude to detect voltage signals over a wide dynamic range and of variable signal strength. The circuit components include two transistor amplifiers, a pair of emitter follower transistors, a coupling capacitor, resistors and a diode.

Patent 3,145,379 Div. 8

SEQUENTIAL SIGNAL DETECTOR.
Navy-assigned Patent,
by James W. Caspers. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Demodulators), (*Demodulators, Radar equipment), Radar receivers, Noise (Radar), Radar signals, Gates (Circuits), Attenuators, Networks, Circuits.

The sequential signal detector is for determining the presence or lack of presence of a sequential signal in a noise background. The detector is associated with a radar receiver. The system includes a gating circuit, an adjustable attenuator, a summing circuit, two comparing circuits and a recycling network.

Patent 3,146,138 Div. 8, 14, 25

VACUM EVAPORATED BARRIER FOR A CdS CRYSTAL.
Air Force-assigned Patent,
by Fred A. Shirland. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Semiconductor devices), (*Vapor plating, Crystals), (*Cadmium compounds, Sulfides), Single crystals, Coatings, Vacuum apparatus.

A method is taught of forming a barrier layer on a cadmium sulfide single crystal or cadmium sulfide polycrystalline layer. The barrier layer cell is prepared by use of a vacuum evaporated barrier layer coating operation.

Patent 3,146,454 Div. 8

RIDGED WAVEGUIDE FED SCIMITAR ANTENNA.
Air Force-assigned Patent,
by Wilfred N. Caron. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Antennas), Waveguides, Antenna feeds, Antenna configurations.

The waveguide fed antenna structure includes an arrangement which provides a conductive ground plane surface, a waveguide of the ridge type opening into the ground plane surface and a folded stub antenna positioned on the opposite side of the ground plane surface with respect to the waveguide. The antenna has its feed point connected to a ridge of the waveguide and its other end in contact with the ground plane surface on the same side of the waveguide as the ridge.

Patent 3,147,385 Div. 8

CASCADED RELAY CHANNEL SELECTING SYSTEM.
Navy-assigned Patent,
by Clare N. Burgis. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Channel selectors), (*Channel selectors, Relays), Cascade structures, Control systems, Circuits.

The multi-channel selecting system includes a series of relays each of which incorporates a number of selectively-energizable windings corresponding to the number of possible positions of the relay. The system is designed so as to preclude interaction between various control circuits when any particular one of the circuits is selectively energized.

Patent 3,147,419 Div. 8, 6

TRANSDUCER COILS ENERGIZING SCR GATE CIRCUIT.
Navy-assigned patent,
by George W. Cope. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gates (Circuits)), (*Gates (Circuits), Transducers), (*Transducers, Gates (Circuits)), Coils, Underwater sound equipment, Detection, Power supplies, Capacitors, Silicon, Rectifiers.

The transducer is of the type employed in underwater target detecting. The circuit includes a magnetic transducer element, a pulse source, a current source, a storage capacitor, two actuating coils and two silicon controlled rectifiers. (Author)

Patent 3,147,478 Div. 8, 6

INFLATABLE TRACKING ANTENNA.
Air Force-assigned Patent,
by Walter W. Bird. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Antennas), (*Antennas, Tracking), (*Inflatable structures, Antennas), Supports, Rotation, Electromagnetic waves, High-frequency.

A collapsible antenna assembly support is provided within an inflatable shell which can be mounted for rotation on a rotatable tracking assembly so as to uniformly distribute the weight and stabilize the antenna assembly for the distortionless reflection of high frequency electromagnetic waves.

PB-166 380 Div. 8
OTS Prices: HC $1.00/MF $0.50

Weather Bureau, Washington, D. C.
WEATHER BUREAU TRIGGER SYNCHRONIZER MODEL NO. 1.
by Robert R. Miller. 20 Sep 63, 10p IED-4
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Radiofrequency interference, Reduction), (*Synchronization (Electronics), Radar equipment), (*Radar equipment, Synchronization (Electronics)), Meteorological radar, Radar interference, Stabilization systems, Trigger circuits, Power supplies, Modules (Electronic), Wiring diagrams.

A method of eliminating radio-frequency interference between two adjacent radar systems is described. Specifications are given plus general theory with references to a schematic. Successful use indicates that the system is practicable. (Author)

9. Fluid Mechanics

PB-166 407 Div. 9
OTS Prices: HC $2.00/MF $0.50

Rosemount Aeronautical Labs., Univ. of Minnesota, Minneapolis.
EXPERIMENTAL INVESTIGATION ON EVAPORATIVE FILM COOLING OF A HYPERSONIC NOZZLE THROAT SECTION,
by R. Hermann and W. L. Melnick. 1956, 28p
Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Hypersonic nozzles, Film cooling), (*Film cooling, Hypersonic nozzles), Evaporation, Velocity, Boundary layer, Thickness, Coolants, Water, Films, Hypersonic flow.

An experimental investigation evaporative film cooling of a hypersonic nozzle throat section was conducted in the 12 x 12 inch hypersonic wind tunnel of the Rosemount Aeronautical Laboratories. Coolant (water) was injected through a thin strip of porous metal located upstream of the throat where the average Mach number is 0.08. The object of this investigation was to determine the influence of evaporative film cooling on the nozzle flow. For this purpose a transverse pitot pressure survey was made along the horizontal tunnel center plane at several locations downstream of the throat. Impact pressure, mass flux and total temperature measurements were made in the boundary layer on the nozzle wall at a station where M = 4.73. The results are as follows: (1) For T sub o = 682R, there is a 0.63 percent decrease in Mach number at the survey plane with the presence of coolant flow as compared to dry flow. (2) The introduction of evaporative film cooling increases the velocity boundary layer thickness approximately 56 percent at the survey station; however no change was detected in the thickness of the thermal boundary layer. (3) The coolant film was observed to be uniform and attached throughout the nozzle. (Author)

10. Fuels and Combustion

Patent 3,149,009 Div. 10, 22

SOLID ROCKET PROPELLANT COMPOSITIONS.

Air Force-assigned Patent,
by Otho D. Ratliff, Jr. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Solid rocket propellants), (*Solid rocket propellants, Patents), Solid rocket oxidizers, Solid rocket propellant binders, Polymers, Pyridines, Elastomers, Solid rocket propellant plasticizers.

The rocket propellant is of the type employing a solid oxidant and a copolymeric binder such as 1,3-butadiene and 2-methyl-5-vinylpyridine. Liquid diene polymers are used as a vulcanizable plasticizer.

11. Ground Transportation Equipment

Patent 3,143,196 Div. 11

DRIVER'S HATCH.
Army-assigned Patent,
by Joseph A. Gutowski and Chester A. Piotrowski.
4 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Tracked vehicles), (*Tracked vehicles, Vehicle accessories), (*Ducts, Tracked vehicles), Vehicle chassis components, Torsion bars.

The hatch door is for use on a track-laying vehicle. The door is urged open by rise of a wound torsion bar. The bar is anchored at one end to the vehicle hull, while the other end is attached to a casing which encompasses the torsion bar. The hatch door engages this casing in such manner that as the hatch is rotated from open to closed position the torsion bar is wound through the casing. The hatch is maintained in closed position by a latching lever. When this lever is actuated to release, the door springs open to its original position.

12. Guided Missiles

Patent 3,144,219 Div. 12

MANNED SPACE STATION.
NASA-assigned Patent,
by Samuel Schnitzer. 11 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Space stations), (*Space stations, Manned), Payload, Launch vehicles (Aerospace), Orbital trajectories.

The manned space station is capable of being completely foldably or collapsibly stored in the payload stage of a multistage launch vehicle, launched into a planetary orbit, and then self-erected into its operating configuration upon actuation of simple built-in mechanical systems.

Patent 3,145,000 Div. 12, 9

LIGHT WEIGHT-HIGH THERMAL RESISTANT AIR-FOIL.
Navy-assigned Patent,
by William L. Mackie. 18 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Airfoils), (*Airfoils, Design), Weight, Heat-resistant materials, Sheets, Ablation, Bonding, Honeycomb cores, Sandwich construction, Guided missiles, Spacecraft.

The airfoil construction is suitable for use in guided missiles and space vehicles. The structure includes a pair of spaced sheet members, a rigid cellular structure between and bonded to the sheet members and an airfoil edge secured to an open space between the sheet members. The airfoil edge is made of ablative material.

Patent 3,145,618 Div. 12, 22

RAMMER MECHANISM FOR A LOADER.
Navy-assigned Patent,
by Richard C. Wilson. 25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Loaders), (*Loaders, Guided missile launchers), Feed mechanisms, Guided missiles, Launching, Ordnance.

The loader is utilized in a guided missile launching system. The rammer forces a missile-booster combination from disengagement with components of a tray of a ready service into engagements with components of a saddle cart and forward and aft floating tracks. The rammer is positioned in one of the trunk sections of a loader, aft of the aft floating track at the loader track level. (Author)

Patent 3,145,656 Div. 12

EXPLOSIVE WARHEAD.
Navy-assigned Patent,
by Melvin A. Cook and Wayne O. Ursenbach.
25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Warheads), (*Warheads, Shaped charges), Charges (Explosive), Detonators, Guided missile warheads, Detonations.

The multiple shaped charge warhead is used in a guided missile. A device is provided for detonating a warhead having a cylindrical bore in a manner whereby detonation is effected simultaneously at all points between the ends of the bore.

Patent 3,145,948 Div. 12

SATELLITE ROTATION BY RADIATION PRESSURE.
Navy-assigned Patent,
by Richard B. Kershner. 25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Satellites (Artificial)),

(*Satellites (Artificial), Rotation), Solar sails, Solar radiation, Pressure, Stability, Orbital trajectories.

Rotation is imparted to a stabilized orbiting satellite by projecting flat-sided blades from the satellite, angulating the blades in the same spin sense with respect to the spin axis of the satellite and pointing the spin axis in the direction of the sun, whereby solar pressure impinges on the blades.

Patent 3,146,670 Div. 12

MISSILE LAUNCHER ASSEMBLY.
Army-assigned Patent,
by Edmond T. Suydam. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile launchers), (*Guided missile launchers, Design), Guided missiles, Launching.

The launcher assembly employs a launch fitting to accurately guide a missile on the launcher rails. It is subsequently positively and mechanically separated from the missile at the terminal end of the launcher rail.

Patent 3,147,391 Div. 12

ANGULAR ACCELEROMETER.
Navy-assigned Patent,
by Bernard Darrel and Paul B. Boswell. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Accelerometers), (*Accelerometers, Guided missiles), Inertial guidance, Instrumentation, Mercury, Cylindrical bodies, Piezoelectric crystals.

The accelerometer is used in a guided missile for missile guidance. The angular accelerometer utilizes a mercury inertial mass which is included within a cylindrical casing and which, when acted upon by angular acceleration, deforms bonded piezoelectric crystal pairs in such a way that an electrical output signal is produced, which signal is proportional to, and indicative of, the angular acceleration forces acting thereon.

Patent 3,148,846 Div. 12

SYSTEM FOR GRAVITY ORIENTING A SATELLITE.
Navy-assigned Patent,
by Robert R. Newton. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Flight control systems), (*Satellites (Artificial), Inertial guidance), (*Flight control systems, Satellites (Artificial)), Gravity, Stabilization systems.

The gravity stabilized satellite permits the use of a directional antenna on the satellite. An extensible boom is used to alter the transverse moment of inertia of a despun, magnetically oriented satellite in orbit. A lossy spring is used to damp out the satellite librations about the stabilized axis. (Author)

Patent Design 198,881 Div. 12, 1

RE-ENTRY VEHICLE OF SIMILAR ARTICLE.
Air Force-assigned Patent,
by Jesse J. King, John H. Boucher and Cecil V. Carter.
Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reentry vehicles), (*Reentry vehicles, Design), Aerodynamic configurations, Aerodynamic control surfaces, Wing-body configurations, Aircraft canopies, Landing gear.

The re-entry vehicle has a short fuselage and wings attached to the sides of the fuselage along their length to form a somewhat delta-like shape with the fuselage. A canopy is positioned on top of the fuselage which is box-shaped in the rear and carries a control surface attached at the end. The landing gear is retracted in flight.

13. Installations and Construction

CAPE-1077 Div. 13, 20

Oak Ridge National Lab., Tenn.
'ORNL' PUMP.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Chemicals, Pumps), (*Pumps, Specifications), Pressure, Temperature, Corrosion inhibition, Materials, Stainless steel, Graphited materials, Chromizing, Cooling, Mechanical drawings.

The small, inexpensive chemical pump operates at a high suction pressure and temperature; is totally enclosed; and has an output of 0 to 20 gpm at 40 ft of water head. The pump operates with a suction pressure from atmospheric to 1000 psi and circulates chemical ranging in temperature to 250C. Higher circulation fluid temperatures are possible if the pressure does not increase above 1000 psi and the temperature at the back of the pump stays below 100C. All materials used in the pump that are subjected to the circulating fluid are selected for good corrosion resistance. All construction materials are of type 347 stainless steel, however, in the back of the pump bearings are constructed of Graphitar No. 14 and a rotor which has a chrome plated journal. The back of the pump is cooled to give the Graphitar and chrome plate the advantage of low temperatures in resisting chemical action. (20 drawings). (AEC abstract)

CAPE-1137 Div. 13, 17

Oak Ridge National Lab., Tenn.
PROBE HOLDER FOR HEAT EXCHANGER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Electromagnetic probes, Mechanical drawings), (*Heat exchangers, Electromagnetic probes), (*Welds, Non-destructive testing), Ultrasonic radiation, Pipes, Joints, Recording systems, Potentiometers, Worm gears.

The package contains 2 drawings and 2 photographs. The probe holder, or indexing mechanism gives controlled movement to a probe used in the ultrasonic evaluation of brazed joints between the 0.5 in. OD INOR-8 heat exchanger

tube (with a wall thickness of 0.042 in.) and the tube sheet or header. The joint serves as a sealant to prevent intermixing of incompatible liquids. The probe holder allows longitudinal scans with successive rotary indices, rotary scans with longitudinal indices, and smooth rotation of the probe about its axis. The probe is vertically indexed by ratchet action. Two data potentiometers drive a servo-recorder, which provides an x-y plot of non-bond indications. Two pins on the holder with the probe form a triangular arrangement giving stability to the apparatus during probe rotation, which is provided by a crank and worm gear mechanism. The housing of the probe is fabricated of brass but other parts are stainless steel. (AEC abstract)

OTR-106 Div. 13, 14, 18, 32
OTS Prices: HC $0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
HUMIDITY-CONTROLLED WAREHOUSING.
13 Nov 64, 17p

Unclassified report

Descriptors: (*Storage, Materials), (*Preservation, Food), (*Warehouses, Humidity), (*Humidity, Control), Water supplies, Degradation, Moisture, Driers (Apparatus), Corrosion, Containers, Life expectancy, Costs, Buildings, Design, Temperature, Abstracting, Bibliographies, Reports, Civil defense systems.

Significant reports covering the period since 1961 were selected for this study, with reference to relevant earlier works. Recent government research deals with preservation methods and economics of storage in a variety of environments. Separate programs have studied storage of food, water and equipment, as well as design of humidity-controlled warehouses. The research results are of potential value for manufacturers and other individuals seeking to improve the storage life of materials.

Patent 3,145,726 Div. 13

LIQUID FLOW CONTROL VALVE.
Army-assigned Patent,
by James M. Dunston. 25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Valves), (*Valves, Control), Heaters, Storage tanks, Water, Gasoline, Design, Fluid flow.

The control valve is utilized between a storage tank and a gasoline-fired immersion type water heater. It is both manually and automatically adjustable. The needle valve has a stem which is manually adjustable in a conventional manner. The valve seat is movable with respect to the valve stem in response to changes in the level of the liquid in the reservoir.

Patent 3,148,577 Div. 13

ROCK BOLT ANCHORED BY EXPLOSIVE FORMING.
Interior-assigned Patent,
by Edward W. Parsons. 15 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bolts), (*Bolts, Explosive forming), (*Explosive forming, Construction), Anchors (Structural), Rock (Geology), Mining Engineering, Civil engineering, Fastenings, Shock waves, Explosive actuators.

The rock bolts are used in mining and construction operations as an aid in the support of rock around underground openings or surface rock exposus. The shock wave produced by an explosion is transmitted through a fluid mass to expand the hollow casing of the bolt into contact with the stratified ground.

PB-166 401 Div. 13
OTS Prices: HC $3.00/MF $0.75

Massachusetts Inst. of Tech., Cambridge.
WASHING OF BRINE FROM ICE CRYSTALS.
Research and development progress rept.,
by J. P. Leinroth, Jr., W. P. White, Thomas K. Sherwood, and P. L. Thibaut Brian. Jan 65, 85p
MIT-295-4, DSR-9336
Contract 14 01 0001 295
OSW PR128

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Freezing), (*Ice, Crystals), Particles, Cleaning, Salt, Separation, Fluid flow.

Experimental results are reported for the washing of brine from beds of small plastic and glass beads, and from beds of ice particles prepared by partial freezing of brine. The data are analyzed in terms of a longitudinal-dispersion model which describes the blending of water and brine at the moving wash-water 'front'. The results lend strong support to the validity of the model as a basis for correlating and interpreting ice-washing data. The data show that washing is accomplished with the least loss of fresh water if long columns are used, and with no agitation of the bed. Washing performance improves slightly as wash rate is reduced. Washing is much more effective in flooded than in drained beds. Calculations based on the dispersion model and literature data on washing of sand are used to illustrate the manner in which fresh water wasted varies with the principle design and operating variables for flooded and non-agitated ice-washing columns. (Author)

PB-166 403 Div. 13, 4
OTS Prices: HC $2.00/MF $0.50

Syracuse Univ., N. Y. Research Inst.
THERMODYNAMICS AND KINETICS IN HYDRATE SYSTEMS.
Research and development progress rept.,
by Jeffrey R. Kass, Remigio Fernandez-Martin, Howard L. Empie, and Allen J. Barduhn. Jan 65, 45p
Contract 14 01 0001 343
OSW PR130

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Hydrates), (*Hydrates, Thermochemistry), Chlorine compounds, Fluorine compounds, Halogenated hydrocarbons, Phase studies, Heat of formation, Solubility, Ice, Crystal growth, Dynamics.

The report presents the results of a study of various aspects of the hydrate process for demineralizing sea

water. Work on the chlorine hydrate phase diagram was completed for the pure binary system with no salt present, and the P-T phase relationship and the heat of formation of the hydrate is reported. The critical formation conditions are 28,3C and 6390 mm Hg, and the heat of formation at these conditions is 16,400 cal/gm mole. This quantity increases as the temperature is reduced and becomes 18,800 cal/gm mole at 10C. New data on the solubility of F-142b (CH3CClF2) in water, extend considerably the data previously reported. This hydrating agent appears to be a useful one for desalting sea water and the solubility data are needed for process design work and for kinetic data interpretation. New data is reported on the growth rate of ice crystals in subcooled flowing water although the number of points is limited. (Author)

PB-166 404 Div. 13, 4
OTS Prices: HC $2.00/MF $0.50

Rocketdyne, Canoga Park, Calif.
MECHANISM OF ELECTRODE DEMINERALIZATION.
Research and development progress rept.,
by John Farrar, Sheldon Evans, and G. D. Seele.
Jan 65, 45p
Contract 14 01 0001 334
OSW PR126

Unclassified report

Descriptors: (*Sea water, Salination), (*Electrodes, Salination), Polarization, Oxidation-Reduction Reactions, Electrochemistry, Capacitance, Adsorption, Ions, Carbon, Salinity, Graphite, Dacron, Minerals.

Polarization data gave no evidence for redox processes below potentials corresponding to the decomposition of water (except for the oxidation of hydrogen when it had been pregenerated cathodically). Polarization curves on microelectrodes exhibited typical nonfaradaic behavior. The double-layer capacitance was estimated to be 60 millifarads. Exchange, based upon the number of coulombs passed, was more efficient at paste electrodes than at felt electrodes. Complete cell coulometric experiments indicated a correlation between the uptake of ions and the current passed through the cell. For felt-type electrodes the efficiency averaged only 20 to 30 percent. Current reversal caused a regeneration of the salt concentration in soltuion. Some mechanism other than simple physical adsorption is responsible for this phenomenon since the electrodes had been equilibrated in the sodium chloride electrolyte. When the potential was removed from the demineralization cell, the potential gradually decreased with an attendant transfer of ions back into solution. These tests infer a physical adsorption process which is electrically induced.

PB-166 405 Div. 13
OTS Prices: HC $3.00/MF $0.50

Rocketdyne, Canoga Park, Calif.
NUCLEATION AND GROWTH OF ICE CRYSTALS.
Research and development progress rept.,
by John Farrar and W. S. Hamilton. Jan 65, 56p
Contract 14 01 0001 333
OSW PR127

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Freezing), (*Ice, Crystals), Water, Nucleation, Supercooling, Water supplies, Atmoic structure, Crystal growth.

The basic information regarding nucleation in supercooled water was reviewed. Measurements were performed with water drops and water in bulk. Ice growth was measured as a function of crystal orientation, temperature, flow velocity of solution, salt concentration, and additives. The data were analyzed and correlated with physical constants in mathematical models. (Author)

PB-166 408 Div. 13, 25
OTS Prices: HC $3.00/MF $0.50

Wisconsin Univ., Madison.
ENERGY AND MASS TRANSFER IN PARTIAL-PRESSURE DISTILLATION.
Annual rept. for period ending 1 Sep 64,
by James E. Davis, George O. G. Lof, and J. A. Duffie.
Nov 64, 56p
Contract 14 01 0001 277
OSW PR131

Unclassified report

Descriptors: (*Sea water, Desalination), (*Desalination, Distillation), (*Distillation, Transport properties), Water vapor, Evaporation, Condensation, Heat transfer, Equations of state, Distilling plants, Thermal conductivity, Diffusion, Boundary layer.

The objective of the research is the determination of the mechanisms of energy and mass transfer in distillation equipment containing substantial concentrations of noncondensable gas. The physical process under investigation is the transfer of water vapor across an air space between two parallel plane surfaces, from one of which water is evaporating and on the other of which water vapor is condensing. An extensive survey of the literature in heat and mass transfer by free convection was completed. The problem is being investigated theoretically by formulating the steady state equations of change for the system, and solving them for certain limiting cases. An experimental partial-pressure distillation apparatus was built, and data obtained from this equipment will be analyzed in the framework of the theoretical development in order to establish the mechanisms of energy and mass transfer in this system. The theoretical analysis resulted in the development of two sets of steady state transfer equations, one applicable to a conduction-diffusion process, and the other to a convection process involving temperature and concentration gradients at boundary layers adjacent to each plate.

14. Materials (Non-Metallic)

OTR-103 Div. 14, 4, 25
OTS Prices: HC $0.50/None

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
PHOTOCHROMISM AND PHOTOTROPISM.
Nov 64, 12p

Unclassified report

Descriptors: (*Photochromism, Reviews), (*Photochemistry, Reviews), Optical materials, Dyes, Glass, Chemical reactions, Atomic energy levels, Light, Ultraviolet radiation, Infrared radiation, Nuclear radiation damage, Optical filters, Computer storage devices, Optical equipment, Bibliographies.

Significant reports covering the period since 1962 were selected for this study with reference to relevant earlier works. This project involved the fields of photochromism and phototropism. Programs in these fields have involved extensive inhouse R and D, as well as contracted or sponsored research. Most of this R and D has been concentrated in the visible, near infrared and ultraviolet ranges of the spectrum. Basic research in these fields has been oriented toward elucidating the reaction mechanisms of these compounds. Applied research programs have resulted in the synthesis of new reactive materials and new improved concepts for application of reversible systems. Possible uses of these systems include eye-protective devices, optical memory devices in computers, and modulating or monitoring light valves.

OTR-104 Div. 14, 13
OTS Prices: HC $0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
FIRE-EXTINGUISHING MATERIAL TECHNOLOGY.
Nov 64, 46p

Unclassified report

Descriptors: (*Fire extinguishers, Materials), Fire safety, Water, Viscosity, Nozzles, Design, Freezing point depressants, Foams, Salts, Fires, Inhibition, Flames, Spacecraft, Bibliographies, Reviews, Abstracting, Explosions.

Significant reports covering the period since 1962 were selected for this study, with reference to relevant earlier works. Recent government R and D in fire-extinguishing technology has generally proceeded along two lines: new approaches to existing problems, and solutions to problems generated by advances in technology, particularly aerospace. Increasing the viscosity of water can result in its improved fire-fighting capacity. Altered nozzle design yields further improvement. Inhibited antifreeze salts for water lends effectiveness at temperatures far below freezing. Water-base foams work well on hydrocarbon fires. Dry chemical agents and devices for handling them may be improved by a number of techniques. Means for improving fire-protective equipment in present and future flight vehicles and runways should lead to important spin-off into other areas, as well as advancing present protective practices. A directory on fire research in the U. S. is available, and a comprehensive bibliography of government R and D since 1950 on flames and flame properties.

OTR-105 Div. 14
OTS Prices: HC $0.50

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
FLAME-RETARDANT TEXTILES.
Nov 64, 21p

Unclassified report

Descriptors: (*Textiles, Flammability), Flames, Inhibition, Coatings, Clothing, Thermal conductivity, Fire safety, Finishes and finishing, Bibliographies, Abstracting, Reviews.

Significant reports covering the period since June 1962 were selected for this study, with reference to relevant earlier works. Recent years have seen a trend in research toward the development of nuclear-protection textiles. However, efforts to improve flame-resistant fabrics have not stopped. Studies have been conducted in such areas as fabric thermal conductivity and destructive temperatures, and equipment has been developed to gain more precise information as to the thermal behavior of fabrics. New materials such as Du Pont's HT-1 have been developed and used. Research also has been conducted to find coatings which make the more familiar materials such as nylon and cotton more fire retardant.

Patent 3,141,744 Div. 14, 17, 22

WEAR-RESISTANT NICKEL-ALUMINUM COATINGS.
Navy-assigned Patent,
by Dwight E. Couch, Harold Shapiro, and Abner Brenner.
21 Jul 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Metal coatings), (*Metal coatings, Wear resistance), Nickel, Nickel alloys, Aluminum alloys, Bearings, Pistons, Piston rings, Cylindrical bodies, Gun components.

The coating is for use on bearing surfaces, pistons, piston rings, cylinder walls and gun mechanisms. The composite metal article includes a base metal, a layer of unalloyed nickel and a surface layer of nickel aluminide.

Patent 3,143,512 Div. 14, 1

ADDITION OF BARIUM SULPHATE TO SEALANTS USED IN FAYING SURFACE TYPE JOINTS.
Navy-assigned Patent,
by Paul G. Kline. 4 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Sealing compounds), (*Sealing compounds, Additives), (*Barium compounds, Sulfates), Joints, Fuel seals, Plastic seals, Fuel tanks, Air frames, Surfaces, Lead compounds, Oxides, Sulfides, Polymers.

The sealant is used for making weather and pressure tight joints and fuel tanks in aircraft. It consists of 0.1 to 25 percent by weight of barium sulphate, 5 to 20 percent of lead monoxide and the balance a polysulphide polymer.

Patent 3,143,529 Div. 14, 4

POLYMERIC DERIVATIVES OF 3-AMINO-2,2-DIMETHYLCYCLOBUTANEACETIC ACID.
Agriculture-assigned Patent,
by Glen W. Hedrick. 4 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Polyamide plastics), (*Polyamide plastics, Preparation), Cyclobutanes, Amides, Polymerization, Plastic coatings, Fibers (Synthetic), Glass textiles, Binders.

The homopolymers are useful in the preparation of protective coatings. The copolyamides have fiber-forming properties and are useful in the bonding of glass. A resinous homopolymer of 3-amino-2,2-dimethylcyclobutaneacetic acid is claimed.

Patent 3,143,548 Div. 14, 4

N, N'DIMETHYL-N',N'-BIS(2-HYDROXYETHYL) MELAMINE.

Agriculture-assigned Patent,
by Sidney L. Vail, John G. Frick, Jr., and John D. Reid.
4 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Amines), (*Amines, Patents), (*Textiles, Impregnation), Cotton textiles, Rayon, Additives.

Fabrics made of cotton, rayon and the like are treated with N,N'-dimethyl-N',N'-bis (2-hydroxyethyl) melamine to make them resistant to wrinkling and to improve the resiliency. The treated fabrics also possess wash-and-wear properties.

Patent 3,144,299 Div. 14, 4

WRINKLE RESISTANCE FINISH FOR CELLULOSIC TEXTILES.
Agriculture-assigned Patent,
by John G. Frick, Jr. and John D. Reid. 11 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Textiles), (*Textiles, Finishes and finishing), Fibers, Cellulose Additives, Synthesis (Chemistry), Carbonates, Organic nitrogen compounds, Esters, Formaldehyde, Catalysts.

Cellulosic textile materials are made wrinkle resistant by applying to the textile a product formed from the reaction of a monocarbonate, such as methyl carbamate, ethyl carbamate and two moles of formaldehyde. The product is formed by allowing the carbamate and formaldehyde to react in a slightly alkaline aqueous solution. After the reaction is completed, the solution is diluted to the desired concentration for application to the textile and an acidic catalyst is added to the solution.

Patent 3,145,074 Div. 14, 4

ISOCYANATE TREATMENT OF WOOL IN PRESENCE OF METHYLPYRROLIDONE.
Agriculture-assigned Patent,
by Nathan H. Koenig and Rosa A. Crass. 18 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Woolen textiles), (*Woolen textiles, Antioxidants), Textiles, Additives, Isocyanic acid, Esters, Pyrroles, Ketones.

Wool is chemically modified by reacting it under anhydrous conditions, in the presence of N-methyl-2-pyrrolidone, with an organic isocyanate such as an aryl isocyanate such as an aryl isocyanate. The modified wool is more resistant to oxidizing conditions.

Patent 3,146,202 Div. 14

GELATION INHIBITORS FOR SILICONE OILS.
Air Force-assigned Patent,
by Robert M. Silverstein and Frank R. Mayo. 25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Lubricant additives), (*Lubricant additives, Patents), Silicone plastics, Oils, Gels, Inhibition, O-heterocyclic compounds, N-heterocyclic compounds.

The silicone lubricants are for use in high speed propulsion devices such as high speed engines, aircraft and other propulsion devices. The lubricant contains a silicone oil and, as a gelation inhibitor, from 0.2 to 2.0 percent by weight of 2,5-diphenyloxazole.

Patent 3,146,207 Div. 14, 4

SOLVENT DEGREASING SELF-EMULSIFYING CLEANING COMPOSITION.
Army-assigned Patent,
by Myer Rosenfeld and Robert E. Wagner, Jr.
25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Cleaning compounds), (*Cleaning compounds, Surface-active substances), Greases, Sodium compounds, Calcium compounds, Colloids, Chemical analysis, Organic compounds, Organic solvents, Kerosene, Tar.

The composition is used for removing sodium and calcium base greases, tar asphalt and rust preventatives. It consists, by volume, of 2.5 to 4.5 percent of ethanolamine oleate, .5 to 1.5 percent sorbitan monooleate, and .5 to 3.0 percent of a surface active amine alkyl aryl sulphonate and the rest a solvent consisting of 70 parts high flash coal tar naphtha and 30 parts kerosene.

Patent 3,146,228 Div. 14, 4

N,N'-ETHYLENE BIS (P,P-BIS(1-AZIRIDINYL)-N-METHYL PHOSPHINIC AMIDE) AND HOMOPOLYMER THEREOF.
Agriculture-assigned Patent,
by Leon H. Chance. 25 Aug 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Polyamide plastics), (*Polyamide plastics, Synthesis (Chemistry)), (*Organic phosphorus compounds, Synthesis (Chemistry)), Amides, Polymerization, Plastic coatings, Paints, Paper, Textiles, Additives.

The composition is useful in the production of synthetic coatings, paints, paper treating resins and textile resins. A composition claimed is the homopolymer of N,N'-ethylene bis(P,P-bis(1-aziridinyl)-N-methyl phosphinic amide formed by heating the monomer at about 100 to 170 degrees C.

Patent 3,147,236 Div. 14, 4

EPOXY MONOMERS AND RESINS THEREOF.
Agriculture-assigned Patent,
by William S. Port and Frank Scholnick. 1 Sep 64

Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Epoxy plastics), (*Epoxy plastics, Synthesis (Chemistry)), Stearates, Polymerization, Additives, Amines.

An epoxy resin is prepared by heating a mixture containing a compound such as 4,5-epoxyhexahydrophthalyl bis-(9, 10-epoxy-stearate) and benzyldimethylamine to effect polymerization.

Patent 3,147,432 Div. 14, 4, 30

METHOD FOR MEASURING THE HEAT DISTORTION TEMPERATURE OF RESINS, PLASTICS AND HIGH POLYMERS.
Navy-assigned Patent,
by Robert W. Warfield. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Plastics), (*Plastics, Test methods), Distortion, Heat treatment, Measurement, Temperature, Polymers, Resistance (Electrical), Mathematical analysis, Thermodynamics.

The heat distortion temperatures of resins, plastics and polymers is obtained by measuring the electrical resistivity of test materials continually over broad temperature ranges, measuring the temperatures corresponding to each such resistivity, and plotting such resistivities as functions of temperatures until marked changes of slope occur.

15. Mathematics

PB-166 398 Div. 15
OTS Prices: HC $2.00/MF $0.50

Stanford Univ., Calif. Graduate School of Business.
CHANCE PROGRAMMING WITH JOINT CONSTRAINTS.
Technical rept. no. 9,
by Bruce L. Miller and Harvey M. Wagner. 22 Oct 64, 28p
Grants NSF G24064 and NSF GS552
Unclassified report

Descriptors: (*Linear programming, Mathematical models), Probability, Stochastic processes, Numerical analysis, Nonlinear programming.

A summary is given of a model treated in the chance-constrained programming literature where the model is viewed and solved as an ordinary linear programming problem. A variant of the model is next considered which has a joint constraint, and algorithmic methods are surveyed for obtaining numerical solutions. The model is also generalized to encompass a set of joint constraints. Random linear coefficients are also considered.

16. Medical Sciences

Patent 3,145,712 Div. 16

PERCUTANEOUS MEDICATION DEVICE.
Army-assigned Patent,
by Charles J. Litz, Jr. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Medical equipment), (*Medical equipment, Patents), Injection (Medicine), Capillary tubes, Toxicity, Gases, Skin, Pressure, Radio signals, Radio transmission, Radio receivers, Elastomers, Diaphragms (Mechanics), Ejection, Space medicine.

The device administers medication subcutaneously by capillary discharge under high pressure. It can be attached to a man in space or on the ground. It is designed to respond to a group leader or to a device for sensing the presence of an injurious gas. A radio transmitter is energized by a gas sensor or the leader and a radio receiver receives the signal to fire an explosive. This develops a gas pressure which operates on an elastomer diaphragm to eject the medication.

Patent 3,147,261 Div. 16, 4

N-ACYL-N'-METHYLPIPERAZINES.
Agriculture-assigned Patent,
by Robert R. Mod, Evald L. Skau, Sara P. Fore, Frank C. Magne, and Arthur F. Novak. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drugs), (*Germicides, Synthesis (Chemistry)), (*Fungicides, Synthesis (Chemtry)), Amides, Azines, Aliphatic compounds.

The derivatives of aliphatic acid amides exhibit antimicrobial activity. The substituted amides are effective against bacteria, yeasts, and molds, many of which are pathogenic. A product is N-decanoyl-N'-methylpiperazine.

Patent 3,147,280 Div. 16, 4

PREPARATION OF BENZOFURAN DERIVATIVES.
Agriculture-assigned Patent,
by Leonard Jurd. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents , Hormones), (*Estrogens, Synthesis (Chemistry)), Coumarins, Ketones, O-heterocyclic compounds, Steroids.

The benzofuran derivatives exhibit estrogenic properties and may be used in animal husbandry. Coumestrol is synthesized by reacting 2-(2,4-dihydroxyphenyl)-3-carboalkoxy-6-hydroxy benzofuran with a strong acid in the presence of water to cause hydrolysis of the 3-carboalkoxy group and lactonization thereof with the 2-hydroxy group on the phenyl ring to produce coumestrol.

PB-166 318 Div. 16, 28
OTS Prices: HC $6.00/MF $1.25

Research Analysis Corp., McLean, Va.
A STUDY OF COMBAT STRESS, KOREA 1952.
Preliminary rept.,
by Stanley W. Davis, Fred Elmadjian, Muriel E. Johnston, David Minard, and Ernest R. Kolovos.
5 Dec 52, 222p RAC-T-41(FEC)
Contract DA44 109qm266, Proj. DAS6 FAST
AD 16 398
Unclassified report

Declassified 13 Mar 53.
Rept. made in cooperation with the Office of Naval Research and the Office of the Surgeon General, U. S. Army.

Descriptors: (*Stress (Physiology), Warfare), (*Neuroses, Warfare), Fatigue (Physiology), Military personnel, Medical examination, Blood chemistry, Hematology, Urine, Dehydration, Adrenal glands, Autonomic nervous system, Psychiatry, Psychometrics, Projective techniques, Reaction (Psychology), Abnormal psychology, Behavior, Motivation, Stress (Psychology),

Leadership, Psychophysiology, Military psychology, North Korea, South Korea.

More than 100 infantry soldiers were examined, tested, and interviewed by a team of physiologists, psychologist, and psychiatrists in order to determine physiological and psychological changes resulting from combat stress in Korea in 1952. The analysis of blood and urine specimens indicated definite physiological changes had resulted from combat. Physiological disturbances included dehydration, absence of certain types of adult white blood cells, and prolonged high levels of adrenal activity. Physiological functions generally had not returned to normal 4 days after combat exposure. Psychological tests of higher mental functions did not indicate significant changes after combat stress. Effective leadership was cited as the most important factor in lessening the stressful experiences of combat. Tests were successfully administered to front-line infantry men with complete subject cooperations. (Author)

PB-166 333 Div. 16, 28
OTS Prices: HC $4.00/MF $0.75

Research Analysis Corp., McLean, Va.
STRESS IN INFANTRY COMBAT.
Technical memo.
by S. W. Davis and J. G. Taylor. Apr 55, 1 0p
RAC-T-295
Contract DA44 109qm266
AD 69 455

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Stress (Physiology), Warfare), (*Warefare, Stress (Physiology)), (*Neroses, Warfare), Military personnel, Medical examination, Fatigue (Physiology), Adrenal glands, Proteins, Electrolytes (Physiology), Hematology, Leukocytes, Blood chemistry, Psychometrics, Central nervous system, Military psychology, Stress (Psychology), Apptitude tests, North Korea, South Korea.

Some important facts are presented concerning (1) the different physiological conditions of groups engaged in combat of varying intensity and length; (2) the differences among individuals in each of the groups; and (3) the respective recovery times for these groups. Evidence indicated that being in a blocking position behind the main line of resistance did not alter the physiological function of the combat infantryman. A short period of intense combat resulted in a characteristic set of physiological changes which included a high degree of adrenal responsiveness, increased protein destruction, and a shift in body salt balance. Longer, less-intense combat resulted in a low degree of adrenal responsiveness, normal protein destruction, and a shift in salt balance opposite to that of the more intense combat. The evidence also indicated that the responses were not uniform in the intense situation but were quite consistent in the longer, less intense combat. Men exposed to the same combat reached the period of maximal physiological adaptation to stress at different times.

17. Metallurgy

OTR-102 Div. 17
OTS Prices: HC $0.50/None

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
NICKEL-TITANIUM ALLOYS. STRONG DUCTILE ALLOYS BASED ON NICKEL-TITANIUM INTERMETALLIC COMPOUNDS FOR NON-MAGNETIC TOOLS AND OTHER APPLICATIONS NEEDING WEAR AND CORROSION RESISTANCE (1960-1964).
Oct 64, 8p

Unclassified report

Descriptors: (*Intermetallic compounds, Reviews), (*Nickel alloys, Titanium alloys), (*Titanium alloys, Nickel alloys), Intermetallic compounds, Corrosion-resistant alloys, Ductility, Wear resistance, Reports, Hardness, Magnetic properties, Machining, Ceramic materials, Physical properties, Beryllium alloys, Niobium alloys, Tantalum alloys, Aluminum alloys, Silicon alloys, Refractory metal alloys, Bibliographies.

Significant reports covering the period since 1961 were selected for this study, with reference to relevant earlier works. This is a summary of recent developments in malleable intermetallic compounds for high strength at elevated temperatures, or for unique wear and corrosion resistance as well as elastic and damping applications. The alloys based on the ductile compound TiNi are of particular interest in these specialized applications and promise that other malleable and useful intermetallic compounds may be discovered as a result of research in progress.

Patent 3,142,892 Div. 17

PRODUCTION OF METAL POWDER COMPACTS,
Army-assigned Patent,
by Robert A. Powell and Frank I. Zaleski. 4 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Powder metallurgy), (*Copper alloys, Powder alloys), (*Powder alloys, Copper alloys), Zinc alloys, Powder metals, Lubricants, Lithium compounds, Stearates, Nitrogen, Controlled atmospheres.

The compact is made of about 70 percent copper and 30 percent zinc. The metal powders are mixed with a lubricant and the powder is compressed and sintered in a nitrogen atmosphere. Lithium stearate is employed as the lubricant.

18. Military Sciences and Operations

PB-166 316 Div. 18
OTS Prices: HC $4.00/MF $1.00

Research Analysis Corp., McLean, Va.
FRONTIERS IN PSYCHOLOGICAL WARFARE.
by Paul M. Linebarger. 1 Feb 50, declassified 25 Nov 59, 136p RAC-T-85
Contracts DA44 109qm266, DA44 188ARO1

Unclassified report

Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Psychological warfare, Propaganda), (*Propaganda, Psychological warfare), Enemy personnel, Armed forces (Foreign), United States government, Military personnel, Government (Foreign), Public opinion, Communication systems, History, Leadership, Military psychology, Social psychology, Military intelligence, Political science, Language.

A resurvey of the entire field of psychological warfare is presented in relation to research and development. Reference to World War II lines of research is omitted from the body of the paper and may be found in Appendix I. The chief lines of exploration will be found under the following three headings: (1) Determination of what actually happens; (2) Measurement for all parts of the process; and (3) Skill reduction (i.e., research into the operation designed to explain the character of each step in the operation so plainly and so simply as to permit low-skilled or quickly-trained personnel to perform tasks hitherto achievable only with gifted or experienced personnel).

PB-166 332 Div. 18
OTS Prices: HC $3.00/MF $0.50

Research Analysis Corp., McLean Va.
CASUALTIES AS A MEASURE OF THE LOSS OF COMBAT EFFECTIVENESS OF AN INFANTRY BATTALION.
Technical memo.,
by Dorothy Kneeland Clark. Dec 54, 54p RAC-T-289
Contract DA44 109qm266
AD 59 384

Unclassified report

Declassified 6 Apr 60.

Descriptors: (*Casualties, Warfare), (*Warfare, Casualties), Military personnel, Battle injuries, Stress (Physiology), Stress (Psychology), Leadership, Military tactics, Military intelligence, Military psychology, Military training, Officer personnel, Effectiveness.

The statement that a unit can be considered no longer combat effective when it has suffered a specific casualty percentage is a gross oversimplification not supported by combat data. Casualties can be taken as a significant measure of loss of combat effectiveness only if the proper defining and limiting factors are specified: (1) the type and size of unit must be stated; (2) ranges of loss percentages rather than averages should be used because of the wide variations in data; (3) the nature of the unit's mission must be specified: widely differing ranges of loss percentages are associated with a breakpoint from attack to defense and a breakpoint from defense to withdrawal or collapse; and (4) the time basis on which loss percentages are figured must be specified--cumulative, on day of breakpoint, or whatever. The most meaningful approach to the analysis of an infantry battalion's loss of combat effectiveness in conventional warfare proved to be in terms of duration of time from the start of engagement to breakpoint, considering not only loss percentages but also replacements and the increasing magnitude of attrition factors. No brief categorical statements of these findings can be made.

PB-166 334 Div. 18
OTS Prices: HC $2.00/MF $0.50

Research Analysis Corp., McLean, Va.
A STOCHASTIC ANALYSIS OF LANCHESTER'S THEORY OF COMBAT.
Technical memo.
by Richard H. Brown. Dec 55, 40p RAC-T-323
Contract DA44 109qm266
AD 82 944

Unclassified report

Descriptors: (*Warfare, Lanchester equations), (*Stochastic processes, Lanchester equations), (*Lanchester equations, Stochastic processes), Kill probabilities, Military strategy, Operations research, Probability.

The objective of this work was to investigate certain properties of stochastic attrition processes-specifically to formulate the general problem of the interaction of two groups of combatants when chance plays a role, to show what data must be given before the problem can be solved, to determine explicitly a complete solution of the general problem, to indicate a method for surmounting the practical difficulties encountered, and to carry out this method by analyzing the probability that a given side will win. In applying a stochastic analysis to Lanchester's theory of combat this memorandum considers a certain Markov stochastic process characterized by the initial state and the two functions phi and alpha.

PB-166 335 Div. 18, 22, 30
OTS Prices: HC $5.00/MF $1.00

Research Analysis Corp., McLean, Va.
MONTE CARLO COMPUTER WAR GAMING. A FEASIBILITY STUDY.
Technical memo.,
by R. E. Zimmerman, G. Cramer, and Earl Joseph.
Mar 56, declassified 16 Mar 59, 182p RAC-T-325
Contract DA44 109qm266
AD 94 459

Unclassified report

Prepared in cooperation with Engineering Research Associates, Inc., St. Paul, Minn.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Weapon systems, Feasibility studies), (*Warfare, Simulation), (*Monte Carlo methods, Weapon systems), Tactical warfare, Effectiveness, Game theory, Weapons, Military tactics, Numerical analysis, Operations research, Computers, Terrain.

The object of the study was to develop and test the feasibility of a high-speed computational system permitting the simulation f small-unit combat actions in detail in order to improve the numerical evaluation of proposed new weapons, weapons systems, and tactical doctrines. (Author)

PB-166 336 Div. 18, 11
OTS Prices: HC $5.00/MF $1.25

Research Analysis Corp., McLean, Va.
A METHOD OF EVALUATING THE ADEQUACY OF FUTURE ORGANIZATIONAL MAINTENANCE.
Technical memo.,
by D. G. Malcolm, J. O. P. Hummel, C. E. Clark, and B. W. Holz. Aug 57, 198p RAC-T-348
Contract DA44 109qm266
AD (19) 141 989

Unclassified report

Declassified 26 Sep 60.
Legibility of this document is in part unsatisfactory.
Reproduction has been made from best available copy.

Descriptors: (*Vehicles, Maintenance), (*Maintenance, Vehicles), Logistics, Armed forces transportation, Maintainability, Maintenance personnel, Training, Mathematical models, Failure (Mechanics), Reliability, Military tactics.

The performance of vehicular equipment in the instances examined does not meet the specification for relative freedom from maintenance necessary to permit the movement envisioned in present tentative concepts of future tactics. Experimental evidence indicates it will not be possible to employ proposed concepts of future tactics unless the mean number of miles prior to failure of vehicular equipment is increased from 3 to 12 times. If performance of vehicular equipment is to reach the level now contemplated for the 1965-1970 period, equipment must be improved, better methods must be established for the rapid performance of maintenance, and tactical

operations must be planned with careful consideration for the maintenance requirements. The time that may be spent in any one instance of maintenance is a critical factor in determining the number of vehicles that may have to be abandoned in the course of an operation. Mechanics spend too much time on preventive maintenance and too little time learning quick diagnosis and effective methods of making emergency repairs. Present studies being made by the Army concerning the relations between maintenance and tactical operations are too narrow. Data available in CONUS divisions are not adequate to support types of analysis such as those described in this study. (Author)

19. Navigation

Patent 3,140,908 Div. 19, 7, 12

TERMINAL CONNECTOR CAP.
Army-assigned Patent,
by Robert H. McCutcheon. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Guided missile batteries), (*Guided missile batteries, Protective coverings), (*Protective coverings, Electric connectors), Batteries and components, Electric insulation, Guidance.

The terminal cap is for use with deferred action batteries which are utilized in missile guidance systems. The protective cap, for a terminal connector having contact pins, includes a body of insulating material with a cavity in it. The base portion of the cavity has apertures in register with the contact pins of the connector. The cap includes structure for electrically isolating and shorting out a discrete pair of contact pins, allowing for electrical checks to be made on the other pins without removing the cap.

Patent 3,148,550 Div. 19, 12

ACCELERATION MEASURING GYROSCOPE.
Navy-assigned Patent,
by Lloyd A. Iddings. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gyroscopes), (*Gyroscopes, Inertial guidance), (*Acceleration, Measurement), Instrumentation, Inertial navigation, Piezoelectric crystals, Voltage, Thrust bearings.

The acceleration measuring gyroscope is the type used in an inertial navigation guidance system. The lateral acceleration measuring device is made an integral part of the gyroscope. The gyroscope structure is provided with piezoelectric sensor-reactor crystals located between each of the thrust bearing plates and the support shaft of the gyroscope rotor which convert displacements of the rotor along the support shaft to a voltage proportional to the displacements.

20. Nuclear Physics and Nuclear Chemistry

AD-447 307 Div. 20, 30
OTS Prices: HC $6.00

Radiation Effects Information Center, Columbus, Ohio.

SURVEY OF PARTICLE ACCELERATORS.
Revision no. 1,
by Donald J. Hamman and Walter H. Veazie, Jr.
15 Sep 64, 220p REIC-31, pt. 2, rev. 1
Contract AF33 615 1124
Unclassified report

Continuation of Contract AF33 657 10085.

Descriptors: (*Particle accelerators, Directories), Betatrons, Cyclotrons, Linear accelerators, Lynchrotrons, Laboratories, Laboratory equipment, Radiation damage, Space environmental conditions, Scientific research.

This report presents a revision of the survey of particle-accelerator facilities of possible interest to Government Agencies, Government Contractors, and university investigators prepared in 1963. The report presents data sheets on betatrons, fixed-frequency cyclotrons, frequency-modulated cyclotrons, variable-frequency cyclotrons, linear accelerators, potential-drop machines, and synchrotrons. (Author)

CAPE-573 Div. 20

Lawrence Radiation Lab., Univ. of California, Livermore.
PORTABLE AIR SAMPLER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Radiation monitors, Portable), (*Samplers, Air), Mechanical drawings, Design, Pumps, Operation.

Drawings (34) are included for the sampler, also known as the Giraffe Air Sampler, which is an improved design of a Los Alamos sampler. It may be used in offices and other quiet areas. This improved design has a constant air flow of 1 cfm. An oil-lubricated pump with a recirculating oiling system which is easy to maintain, is used to replace the dry-type vacuum pump used previously. Running time meters make sampling record-keeping simpler. For a listing of individual titles, see the Engineering Materials List (TID-4100). (AEC abstract)

CAPE-993 Div. 20

Chicago Operations Office, Atomic Energy Commission, Ill.
EXPERIMENTAL LOW-TEMPERATURE PROCESS HEAT REACTOR PROJECT.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Heterogeneous reactors, Mechanical drawings), Light water reactors, Pressurized water reactors, Structures, Specifications, Reactor moderators, Reactor fuels, Uranium compounds, Dioxides.

The package contains 218 drawings. The reactor is a closed-cycle, heterogeneous, pressurized-water-type reactor cooled and moderated by light water. The fuel is low-enrichment uranium dioxide pellets. The reactor is rated at 40 Mw(t). The facility consists of a reactor building, service building, and auxiliary external structures. (AEC abstract)

CAPE-1089 Div. 20

Oak Ridge National Lab., Tenn.
FALLOUT MONITOR Q-2256 .
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Radiation monitors, Specifications), (*Radioactive fallout, Radiation monitors), Design, Radiation measurement systems, Gamma rays, Bata particles, Alpha particle detectors, Scintillation counters.

Eight drawings are included for a fallout monitoring system. The collector-detector system consists of a disc covered with aluminum foil which rotates at 1 rpm. Fifty percent of the disc area is always exposed to collect fallout. As the disc rotates it carries the particles under a shielded GM tube that counts the beta-gamma radioactivity and then under a scintillation-type probe that counts the alpha radioactivity. The GM tube is either a Lionel 106C. or an Amprex 90N88. Drawings for the scintillation probe (Q-2101) are in CAPE-1131. (AEC abstract)

CAPE-1090 Div. 20

Oak Ridge National Lab., Tenn.
ALPHA SCINTILLATION COUNTER, SAMPLE CHAMBER (Q-2287).
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Scintillation counters, Mechanical drawings), Phosphorescent materials, Zinc compounds, Sulfides, Silver, Phototubes, Plutonium, Radioactive isotopes, Alpha counters, Count-rate meters, Specifications.

This package contains 3 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). The counter is used for counting smear samples. It was designed to be used with a standard G-M tube scaler. The smear sample is placed in a well 2 in. in dia. and 0.125 in. deep in a movable slide in the light-tight sample chamber. The slide is operated to position the sample under the detector. A ZnS(Ag) phosphor coupled with Scotch tape to the end of an RCA-6655A phototube serves as the detector. A double guard ring used as a light seal makes it possible to keep high voltage on the phototube at all times. Results gave a count rate that was 44% of the disintegration rate of a Pu 239 source. Background for 4 to 5 hr was a minimum of 2.65 counts per hr and a maximum of 3.75 counts per hr. (AEC abstract)

CAPE-1097 Div. 20

Hanford Atomic Products Operation, Richland, Wash.
PROCESS TUBE AND FUEL HANDLING CARRIAGE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Reactor system components, Mechanical drawings), (*Handling, Reactor fuel elements), (*Reactor fuel elements, Handling), Stainless steel, Underwater, Drives, Cordage, Wire, Pipes.

This package contains 12 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). This stainless steel carriage is used under water for hot fuel element handling and disassembly. A ratiomotor drives a 7.5 in. by 4 in. cable reel on which the wire rope is stored. The carriage is approximately 18 x 9 x 5 ft. (AEC abstract)

CAPE-1098 Div. 20

Hanford Atomic Products Operation, Richland, Wash.
FUEL ROD SCANNER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Reactor system components, Mechanical drawings), (*Reactor fuel rods, Monitors), (*Monitors, Reactor fuel rods), Fuel burn up, Gamma rays, Scanning.

This package contains 7 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). The gamma energy scanning system is designed to scan indicated fuel rods to determine burnup of the fuel material per increment of fuel length. (AEC abstract)

CAPE-1100 Div. 20

Oak Ridge National Lab., Tenn.
FOAM COLUMN.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Foams, Separation), (*Radioactive waste, Separation), (*Industrial equipment, Mechanical drawings), Liquids, Processing, Steel, Carbon alloys, Pipes, Acrylic resins.

This package contains 3 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). This 24 in. foam separation column is used in the countercurrent exchange of solutes between a liquid and the surface of a foam. This method of separation is employed in low-level waste processing. Sight glasses and light ports were fabricated from Plexiglas for the carbon steel column. (AEC abstract)

CAPE-1104 Div. 20, 26

Oak Ridge National Lab., Tenn.
CERN GENERAL PURPOSE CHASSIS.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Reactor system components, Mechanical drawings), (*Packaging, Reactor system components), (*Reactor controls, Reactor system components), Standardization.

Fourteen drawings are included for a chassis system that standardizes the packaging of hardware used in reactor control systems. The plug-in chassis and plug-in card modules are designed so that each item may be constructed in many different sizes. All dimensions are given in millimeters but factors for conversion to inches are included on each drawing. (AEC abstract)

Patent 3,141,092 Div. 20

SELECTOR FOR FAST AND INTERMEDIATE ENERGY NEUTRONS POSITIONED WITHIN MODERATOR AND ABSORBER SHIELDS.
AEC-assigned Patent,
by Leo H. Weinberg. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Dosimeters), (*Dosimeters, Nuetrons), Neutron absorbers, Thermal neutrons, Fast neutrons, Shielding, Dosage, Probability, Tissues (Biology), Reactor moderators.

The detector of the dosimeter is positioned inside the compensating shield which is composed of a neutron slowing material and a neutron absorbing material. The fast and intermediate energy neutrons pass into the

compensating shield and are converted to thermal neutrons, such that the probability of detection of thermal neutrons produced by the higher energy incident neutrons is increased in proportion to the neutron energy dosage response of the human tissue.

Patent 3,141,235 Div. 20

POWERED TANTALUM ARTICLES.
AEC-assigned Patent,
by William H. Lenz. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor systems components), (*Reactor fuels, Containers), (*Tantalum, Containers), Powdered metals, Yttrium.

The tantalum metal is used in containers for nuclear reactor fuels. A ductile, workable, sintered tantalum metal article contains one to three percent yttrium and tantalum.

Patent 3,143,478 Div. 20

HIGH FLUX BEAM REACTOR.
Atomic Energy Commission-assigned Patent,
by Jack Chernick, Kenneth W. Downes, Julius M. Hastings, Joseph M. Hendrie, and Herbert J. C. Kouts.
4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Neutron beams), Heavy water reactors, Reactor cores, Uranium, Reactor moderators, Reactor coolants, Reactor reflectors.

The nuclear reactor is for use as a source of external beams of high intensity neutrons. The reactor has an under-moderated core of fully enriched U-235, externally moderated by a heavy water moderator, reflector and coolant region for establishing thermal flux peaks in that region.

Patent 3,144,393 Div. 20

SUBCOOLED LIQUID INLET FOG COOLED NUCLEAR REACTORS.
AEC-assigned Patent,
by Marvin Raber and George A. Sofer. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Reactor coolants), Vapors, Liquids, Reactor moderators, Velocity.

The fog-cooled nuclear reactor is provided with subcooled liquid inlet to the coolant channels. The reactor has higher coolant mass velocities and separation of the coolant and moderator by coolant channel tubes such that the bulk of moderation occurs in the spaces outside the coolant channels.

Patent 3,145,078 Div. 20

METHOD OF REPROCESSING NUCLEAR FUEL ELEMENTS.
AEC-assigned Patent,
by Gerald Strickland, Richard Johnson, Frederick L. Horn, and Charles B. Bartlett. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), (*Uranium, Purification), Reactor fuel elements, Reactor fuel cladding, Zirconium, Zirconium alloys, Strontium alloys, Aluminum, Carbides, Separation, Nitrogen compounds, Oxyfluorides.

The process is for the recovery of uranium from spent fuel elements in which the uranium is mixed with, clad with, or alloyed with, zirconium, zirconium-alloy, stainless steel, aluminum or a carbide. The fuel element is contacted and reacted with liquid NOF.X(HF), wherein X is an average number ranging from 3 to 12, at about 80 to 100 degrees F.

Patent 3,145,151 Div. 20

FUEL ASSEMBLY FOR LOW POWER REACTORS.
AEC-assigned Patent,
by Eward F. Groh. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel plates), (*Reactor fuel plates, Nuclear reactors), Reactor fuel elements, Reactor fuels.

The fuel assembly is for use in a nuclear reactor. The fuel assemblies are composed of a number of fuel plate assemblies each of which may be altered to contain any combination of one or several fuel plates, poison plates, or plates of other test materials.

Patent 3,145,300 Div. 20

DUAL SENSOR GAMMA RAY CALORIMETER.
Air Force-assigned Patent,
by James R. Coss, Maurice J. Cote, and Philip B. Hemmig. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Calorimeters), (*Dosimeters, Gamma rays), Temperature sensitive elements, Thermal conductivity, Radiation measurement systems, Electricity, Composite materials.

The gamma ray dosimeter has, as a sensing element, two spaced bodies of dissimilar materials joined by a thermally conductive connection. Both bodies are subjected to the radiation to be measured. The electrical output from the sensing element is proportional to the difference in the temperature of the bodies.

Patent 3,145,333 Div. 20

FORCE LIMITING DEVICE FOR MOTOR CONTROL.
AEC-assigned Patent,
by John A. Pardini and Victor Hutter. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Drives), (*Reactor fuel elements,

Drives), (*Drives, Positioning devices (Machinery)), Nuclear reactors, Control systems, Engines and motors, Force (Mechanics), Motion.

The driving and driven members of the apparatus are for use in positioning a tool for manipulating fuel elements in a nuclear reactor. The drive system includes driving and driven members, a spring device yielding transmitting motion of the driving member to the driven member, a drive motor, and an arrangement to stop the driving member in the event of excessive movement of the driving member with respect to the driven member.

Patent 3,146,064 Div. 20

DECONTAMINATION OF URANIUM.
AEC-assigned Patent,
by Robert L. Moore. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Decontamination), (*Uranium, Decontamination), (*Decontamination, Uranium), Refining (Metallurgy), Neutrons, Nuclear particles, Ores (Metal sources), Plutonium, Zirconium, Complex compounds, Fluorides, Radiation chemistry.

The process is concerned with the decontamination of uranium derived from the recovery processes of neutron-irradiated uranium and with the recovery of uranium from ores. Both tetravalent plutonium and zirconium can be converted to a solvent-nonextractable state by complexing them with a fluoride-containing anion.

Patent 3,146,173 Div. 20

FUEL ELEMENT.
A.E.C.-assigned Patent,
by Lloyd R. Zumwalt and Diavid C. Morse. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel elements), Nuclear reactors, Power supplies, Graphite, Neutrons, Permeability, Fission products.

The fuel element is utilized in a nuclear reactor for the generation of power. The fuel element structure includes a plurality of fuel compacts or slugs, the compacts being of any suitable size and shape commensurate with the requirements of the fuel element and reactor core design. The plurality of fuel compacts are assembled in stacked relation with a fuel can which is formed of neutron moderating material, preferably graphite, which has been formed or treated to provide a very low permeability to fission products. Each fuel compact is of suitable size and shape and comprises an outer region of a mixture of fuel and moderator and a hollow central core of moderator.

Patent 3,146,281 Div. 20, 14

PRODUCTION OF ROUND PARTICLES OF CERAMIC MATERIAL.
AEC-assigned Patent,
by Casimer Krystyniak, Angelo T. Muccigrosso, and George L. Ploetz. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor poisons), (*Reactor poisons, Refractory materials), Boron, Carbides, Spheres, Particles, Binders, Graphite, Mixtures, Vibration, Ceramic materials, Reactor materials, Separation.

The boron-carbide-base refractory material is used as a poison in nuclear reactors. The spherical particles are prepared by mixing boron carbide with a binder, compacting the mixture, crushing the compact into particles, abrading the particles to round the surfaces, mixing the particles with graphite. This mixture is heated, cooled and abraded to smooth the surfaces of the particles. The nonspherical particles are separated out by vibration on a glass table.

Patent 3,147,088 Div. 20, 17

URANIUM-TIN-ZIRCONIUM CORROSION RESISTANT ALLOY.
AEC-assigned Patent,
by Herbert S. Kalish and Henry H. Hausner. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel cladding), (*Reactor fuel cladding, Corrosion-resistant alloys), (*Corrosion-resistant alloys, Nuclear reactors), Cladding, Uranium alloys, Tin alloys, Zirconium alloys.

The clad uranium containing body for a nuclear reactor consists of 10 percent uranium, five percent tin and the balance zirconium.

Patent 3,147,109 Div. 20, 4

SEPARATION OF PLUTONIUM, URANIUM, AMERICIUM AND FISSION PRODUCTS FROM EACH OTHER.
AEC-assigned Patent,
by James B. Knighton and Robert K. Steunenberg.
1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel processing), (*Reactor fuel processing, Patents), Uranium, Plutonium, Americium, Fission products, Separation, Magnesium compounds, Halides, Magnesium alloys, Zinc alloys.

The process includes introducing material containing a mixture of americium and plutonium into a molten halide flux that contains magnesium halide, adding a binary magnesium-zinc alloy in which the magnesium content is at least 10 percent by weight, whereby americium is preferentially taken up by the flux while plutonium is preferentially taken up by a metal phase, and separating the flux from the metal phase.

Patent 3,147,379 Div. 20, 30

METHOD FOR MEASURING THE POWER LEVEL OF A NUCLEAR REACTOR.
AEC-assigned Patent,
by Sigmund P. Harris. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor power density), (*Reactor power density, Measurement), Boiling water reactors, Radiation measurement systems, Coaxial cables, Voltage, Instrumentation.

The nuclear reactor is of the water boiler type. A

coaxial cable is placed in the core of the reactor. The cable has a central electrical conductor, a solid insulator surrounding the conductor and a ground sheath around the insulator. The ground sheath is connected to ground. The reactor is pulsed and the radiation-induced voltage between the ground and conductor is measured. The induced voltage is proportional to the power level of the reactor.

Patent 3,147,396 Div. 20

METHOD AND APPARATUS FOR PHASING A LINEAR ACCELERATOR.
AEC-assigned Patent,
by David J. Goerz, Richard B. Neal, and Kenneth B. Mallory. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Phase control devices), (*Phase control devices, Linear accelerators), (*Linear accelerators, Phase control devices), Particle accelerators, Particle accelerator components.

The apparatus is for phasing a linear accelerator waveguide section. The system is useful for phasing very long accelerators. The phase relation of the electromagnetic energy at different points in each accelerator section is utilized.

Patent 3,148,941 Div. 20

DISSOLUTION OF URANIUM-MOLYBDENUM REACTOR FUEL ELEMENTS.
AEC-assigned Patent,
by Theodore A. Gens. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Reactor fuel elements), (*Reactor fuel elements, Separation), Uranium, Molybdenum, Hydrogen compounds, Chlorides, Gases, Oxychlorides, Vaporization, Oxides.

Uranium is separated from a uranium-molybdenum composition by contacting the composition with a gaseous mixture of hydrogen chloride and air at from 400 to 600 degrees C. to selectively volatilize a portion of the molybdenum as molybdenum oxychloride. The resultant uranium oxide-containing residue is recovered.

Patent 3,149,043 Div. 20

NUCLEAR REACTOR.
AEC-assigned Patent,
by Lester Goldstein, Leon Joseph, Morton S. Silberstein, and Albert A. Weinstein. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Nuclear reactors), (*Nuclear reactors, Research reactors), Reactor cores, Reactor fuel elements, Design.

The nuclear reactor is designed for use in research. The reactor incorporates a core shaped in cross section like a regular hexagon with a central hole of the same shape wherein the core is made up of a plurality of fuel elements which are rhombuses in cross section. The fuel elements consist of a plurality of parallel, flat fuel plates oriented generally so as to be parallel to the boundaries of the core, the fissionable material content of the plates increasing in graduated steps from the boundaries.

Patent 3,149,044 Div. 20

ADVANCED TEST REACTOR.
AEC-assigned Patent,
by Deslonde R. de Boisblanc and Byron H. Leonard, Jr.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test reactors), (*Test reactors, Reactor operation), Reactor cores, Reactor control.

The reactor has a quatrefoil core configuration which has nine flux trap test spaces--one in each lobe of the quatrefoil, one at the center of the quatrefoil, and one between each pair of lobes. Controllable power distribution between separate lobes is obtained by chemical shim controls just outside each lobe and in the neck region of each lobe.

PB-166 399 Div. 20, 25
OTS Prices: HC $1.00/MF $0.50

Illinois Univ., Urbana.
PRODUCTION OF SIGMA HYPERON AND PION PAIRS.
Technical rept.,
by R. D. Hill and d. g. Ravenhall. Oct 64, 7p
unclassified report

descriptors: (*Sigma hyperons, Nuclear reactions), (*Pions, Pair production), K mesons, Carbon, Nucleons, Nuclear resonance, Nuclear cross sections.

Consideration is given to factors in the (K-negative meson + C 12) system that could give rise to an apparent width in the sigma hyperon-pion system of only a few MeV.

21. Nuclear Propulsion

No Entries

22. Ordnance

Patent 3,140,886 Div. 22, 12, 30

COUPLING DEVICE.
Navy-assigned Patent,
by Edward J. Cotilla and George A. Gimber.
14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Couplings), (*Couplings, Separation), Rocket motors, Payload, Automatic, Detonations, Underwater sound equipment, Cylindrical bodies.

The coupling device is for securing and automatically separating a rocket motor from its payload after burnout or for separating elements of a sonobuoy from each

other. The connector is associated with two cylindrical casings which are to be separated. The casings are secured by an insert and lip, each with radial slots which register with each other. Bolts are detonated electrically to cause separation of the casings.

Patent 3,141,559 Div. 22

UNIVERSAL LOADER.
Navy-assigned Patent,
by Leo Oragonuk. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bomb handling vehicles), (*Bomb handling vehicles, Patents), (*Weapons, Handling), Ground support equipment, Vehicle chassis components, Hoists, Control systems.

The material handling apparatus is for loading aircraft weapons. It includes a vehicular chassis, a telescoping boom, a command unit, and a variety of controls associated with the boom and a pulley system.

Patent 3,143,072 Div. 22, 8

PROXIMITY FUZE ANTENNA.
Navy-assigned Patent,
by Albert H. Dell, John H. Kuck, and Jules H. Sreb.
4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Proximity fuzes), (*Proximity fuzes, Loop antennas), (*Loop antennas, Proximity fuzes), Design, Capacitors.

The loop antenna may be incorporated in a fuse to serve in place of the conventional dipole antenna. Capacitors are provided in the antenna loop that may be to the desired values of capacitance. A single loop fulfills simultaneously the functions of both antenna and tank circuit.

Patent 3,143,820 Div. 22

RIFLE MAGAZINE ASSEMBLY.
Army-assigned Patent,
by John J. Lucianetti, Edward R. Hirsekorn, Herbert R. Burgess, Jr., and William J. Rose. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Breech mechanisms), (*Breech mechanisms, Feed mechanisms), Small arms, Gun components, Springs.

A factory-loaded 20-round cartridge can be manually inserted into a modified version of a rifle magazine. The follower spring of the magazine is maintained in an unstressed condition at times other than when a firing mission is under way.

Patent 3,143,922 Div. 22

VANE TYPE ROTARY MOTOR FOR GUN.
Army-assigned Patent,
by Samuel Altschuler and Wayne F. Ridenour.
11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gun components), (*Gun components, Design), Guns, Powders, Gases, Operation, Gun barrels.

A stationary housing has a rotor carrying the barrels. The rotor is operated by the action of the powder gases in passing into multiple chambers and blocked by multiple vanes attached to the housing and cooperating with the rotor. A pair of slipper valves control the flow of the powder gases which are distributed by a manifold into multiple ports leading into the multiple chambers.

Patent 3,143,964 Div. 22

ARMING AND FIRING MECHANISM.
Navy--assigned Patent,
by Charles Young, Jr. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Arming devices), (*Arming devices, Firing mechanisms (Ammunition)), (*Firing mechanisms (Ammunition), Arming devices), Depth charges, Mines (Ordnance), Depth charge components, Mine components, Safety devices, Springs, Cams.

The arming and firing mechanism is utilized in a mine or depth charge. A spring and cam powered switch mechanism is provided having a locking arrangement of an arming cam to prevent premature accidental arming of the ordnance weapon and permit positive and reliable operation of the arming cam upon the occurrence of an arming event.

Patent 3,144,644 Div. 22

GUN FIRE CONTROL METHOD AND SYSTEM.
Navy-assigned Patent,
by Ivan A. Getting. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fire control systems components), (*Fire control systems components, Antiaircraft guns), Naval guns, Radar gun sights, Firing mechanisms (Weapon).

The fire control apparatus is for use aboard a vessel firing at an aerial target. Radar is employed for obtaining information concerning the position of the target and this information is utilized to control the firing of a gun.

Patent 3,144,808 Div. 22

RECOILLESS RIFLE FIRING MECHANISM.
Army-assigned Patent,
by Walter B. Stapp and Francis W. Dietsch. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing mechanisms (Weapon)), (*Firing mechanisms (Weapon), Recoilless guns), Nozzles, Projectiles, Locking fastener devices, Gun barrels, Small arms.

The portable recoilless rifle fires a fin stabilized projectile. The structure includes a nozzle which is clamped to the breech end of a barrel by a lock ring. A

control lever functions to release the nozzle and lock ring from the barrel and is automatically locked against rotation during opening and closing of the nozzle. When the nozzle is closed, the lever is automatically released for a limited rotation whereby the nozzle is clamped to the barrel.

Patent 3,144,809 Div. 22

BREECH BLOCK OPERATING MECHANISM.
Navy-assigned Patent,
by Philias H. Girouard, Carl V. Hickman, Garold A. Kane, John I. Nelson, and Milton C. Neuman. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Breech mechanisms), (*Breech mechanisms, Naval guns), Gun components, Gun mounts.

The gun system is for major caliber guns with calibers of five inches or more. A mount for the gun is provided including apparatus for supplying ammunition to the gun. A series of cooperating mechanisms move the round from the loading deck of a ship to the gun. The breech block is powered from an accumulator system.

Patent 3,144,810 Div. 22, 31

AUTOMATIC FEED AND CONTROL MECHANISM.
Navy-assigned Patent,
by Arthur J. Stanton, David F. Anderson, Richard E. Taylor, Robert Butterworth, and Russell T. Shawen. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Feed mechanisms), (*Feed mechanisms, Rocket assisted projectiles), (*Rocket assisted projectiles, Feed mechanisms), Ship auxiliary equipment, Handling, Automatic, Pneumatic systems, Gun auxiliary equipment, Loaders.

The system is for feeding a rocket assisted projectile to a gun or other missile launching device from one deck of a ship to the gun. The assembly includes a plurality of independent gas operated automatic mechanisms for the receiving of ammunition, and indexing it to the firing position.

Patent 3,145,248 Div. 22, 1

OPTICAL SIGHT DISPLACING GLASS.
Air Force-assigned Patent,
by James A. Shuping. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bombsights), (*Gun sights, Low-altitude bombing), (*Bombsights, Low-altitude bombing), Attachment, Aircraft fire control systems, Reticles, Illuminated sights, Reflex sights, Collimators, Lenses.

An aircraft which has a fixed optical sight is provided with an attachment to adapt the fixed gun sight for low altitude bomb delivery. The system includes an illuminating source, a reticle, a collimating lens system, a fixed reflex glass, and a second reflex glass detachably mounted on the fixed glass. The angle between the plane of the second reflex glass and the axis of the lens system is adjustable.

Patent 3,145,495 Div. 22

EXCHANGEABLE REVOLVER CYLINDER AND CARTRIDGE INDEXING DEVICE.
Army-assigned Patent,
by David L. Katz and Cyril A. Moore. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Feed mechanisms), (*Feed mechanisms, Small arms), Gun components, Compatibility.

The firearm is of the magazine-type. It has a magazine of the revolver type in the form of a chambered cylinder. The cylinder is rotated by a spring device to successively index the chambered cartridges at the firing station. The cylinder is easily replaced by another cylinder containing five chambered cartridges. (Author)

Patent 3,145,678 Div. 22

TORPEDO MOTOR MOUNTING STRUCTURE.
Navy-assigned Patent,
by John G. Shmorhun and Elbert H. Lenker. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedo components), Torpedo motors, Structural parts, Torpedo noise, Installation, Handling.

The torpedo motor mounting structure provides noise-isolation and facilitates motor installation and removal. The frame of the motor is provided with end-bells having generally frusto-conical surfaces, and the torpedo tailcone section is provided with a pair of forward and aft ring-shaped ribs located at the motor end-bell stations. The motor mounting structure further includes a pair of noise-isolation ring-shaped members which are tapered to seat upon the end-bells of the motor, and a clamp-ring member which is removably secured to the forward rib in a manner to clamp the propulsion motor and its noise-isolation members between the clamp-ring member and the aft rib.

Patent 3,145,679 Div. 22, 6

ACOUSTIC TORPEDO WARHEAD AND TRANSDUCER APPARATUS.
Navy-assigned Patent,
by John D. Brooks. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Acoustic torpedoes), (*Acoustic torpedoes, Transducers), (*Transducers, Torpedo warheads), Acoustic equipment, Acoustic detectors.

The transducer apparatus is for use in an acoustic torpedo having a high explosive warhead. It includes a transducer and an acoustic window medium between the transducer and the water medium. The window medium is made of an explosive material. The construction permits use of a linear array.

Patent 3,146,140 Div. 22

COMPOSITION COMPRISING TRINITROTOLUENE AND o-NITROPHENOL.
Navy-assigned Patent,
by Virgil I. Milani. 25 Aug 64 Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*TNT, Additives), (*Nitrophenols, Explosive materials), Fracture (Mechanics), Inhibition.

The TNT-containing explosive has improved crack and growth resistance characteristics. The composition is made of trinitrotoluene and ortho-nitrophenol.

Patent 3,146,349 Div. 22

DETECTING HIDDEN EXPLOSIVES USING NEUTRON BEAMS.
AEC-assigned Patent,
by Edward D. Jordan. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Monitors), (*Monitors, Neutron beams), Explosive material, Neutron reactions, Nitrogen, Gamma rays, Measurement.

The apparatus and method may be used for detecting explosives in luggage prior to its being loaded onto an airplane. One method includes irradiating a suspected container with neutrons so that the nitrogen present in any explosive emits a gamma ray which is detected. (Author)

Patent 3,146,443 Div. 22

ANGLE CONVERTER.
Navy-assigned Patent,
by John F. Blackburn. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Fire control system components), (*Fire control system components, Naval gunnery), Range tables, Target angle, Target position indicators, Ordnance.

The angle converter is for use in naval gun fire control apparatus. It includes a pair of rectangular potentiometer windings which are secured to a rotatable support card in mutually perpendicular positions thereon. The support is continuously positioned in accordance with the deck train and deck elevation of the director as the director is automatically positioned to maintain the line of sight thereof on the moving target, so that the axis of rotation of the card is continuously maintained along the line of sight. (Author)

Patent 3,146,671 Div. 22

BREECH BLOCK AND EJECTOR ASSEMBLY.
navy-assigned Patent,
by Philias H. Girouard, Carl V. Hickman, Garold A. Kane, John I. Nelson, and Milton C. Neuman.
1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Breech mechanisms), (*Breech mechanisms, Antiaircraft guns), Ejectors (Ordnance), Naval guns, Gun mounts.

The assembly is for guns with calibers of five inches or better used on ships for anitaircraft or other uses. The mount for the gun includes a breech block which is movable to operative or closed position and to inoperative or open position. A power operated mechanism is provided for moving the block to the various positions.

Patent 3,147,160 Div. 22, 4, 10

DESENSITIZATION OF AMMONIUM PERCHLORATE.
Navy-assigned Patent,
by Walter C. McCrone. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*Explosive materials, Stabilization), (*Ammonium compounds, Perchlorates), Propellants, Crystals, Coatings, Alkali metal compounds, Fluoborates.

Desensitized explosives containing ammonium perchlorate are disclosed. Ammonium perchlorate crystals are desensitized by coating with an overgrowth of a fluoroborate salt of ammonium and alkali metals.

Patent 3,147,162 Div. 22

ORGANIC EXPLOSIVE COMPOSITIONS SUITABLE FOR WEAPON CASINGS.
Navy-assigned Patent,
by James T. Paul, Jr. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Explosive materials), (*Explosive materials, Cartridge cases), Weapons, Containers, Organic materials, RDX, Polyvinyl chloride, Plasticizers, Sebacic acid, Esters.

The explosion composition is for use in fabricating weapon casings. It may contain 70 weight percent of cyclotrimethylene trinitramine, 18 percent polyvinyl chloride, and 12 percent dibutyl sebacate.

Patent 3,147,335 Div. 22

OPTICAL MISS-DISTANCE INDICATOR.
Navy-assigned Patent,
by Fritz A. Guerth. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Firing error indicators), (*Firing error indicators, Optical instruments), Airborne, Targets, Illuminated sights.

The system is for measuring the miss-distance, or firing error, between a missile, rocket or projectile and an airborne target. The indicator operates upon electro-optical principles, in which there is established around the target an imaginary solid figure through which the missile passes, and in which data is derived representative of the points at which the imaginary solid figure is thus penetrated.

Patent 3,148,529 Div. 22, 11, 30

machine for testing shock absorbers.
Army-assigned Patent,
by Ernest W. Posse and Charles E. Rutledge.
15 Sep 64 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Vibration isolators), (*Vibration isolators, Test equipment), Tanks (Combat vehicles), Vechicle chassis components, Pistons, Hydraulic fluids, Armed forces transportation.

The machine is for testing shock absorbers used in tanks, personnel carriers, and like vehicles. A shock absorber is tested by mounting it on one end of a piston which is reciprocated by hydraulic fluid under pressure. The other end of the shock absorber is attached to a stationary mount. The shock absorber is alternately expanded and compressed so that readings can be made from gages.

Patent 3,148,651 Div. 22, 31

TORPEDO CONTROL APPARATUS.
Navy-assigned Patent,
by Julian H. Ray. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Torpedoes), (*Torpedoes, Remote control systems), Guidance, Wire guidance, Telemeter systems.

the multi-channel telecommunication apparatus is for communicating electrical signals between a torpedo and a remote telecommunication station. The wire guided torpedo apparatus may be controlled from a ship or submarine. Apparatus is provided in the torpedo for dispensing the wire as it moves away from the ship.

23. Personnel and Training

Patent 3,143,811 Div. 23, 22

WEAPON AND TARGET SIMULATOR.
Army-assigned Patent,
by Anthony E. Tucci, Samuel E. Torrey, and
Warren D. Haltermeier. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gunnery trainers), (*Gunnery trainers, Design), Weapons, Targets, Simulators, Guns, Gun mounts, Control panels.

The simulator is for testing guns and for training personnel in the use of guns. The essential elements are a gun mount and a gun tube, a control panel, a spotter assembly and a target assembly.

24. Photography and Other Reproduction Processes

Patent 3,143,049 Div. 24

TIME INTERVAL COMPUTER.
Navy-assigned Patent,
by Francis E. J. Tholey. 4 Aug 64 Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Time-interval counters), (*Time-interval counters, Computers), (*Computers, Time-interval counters), Special purpose computers, Camera controls, Aerial cameras, Photographic techniques.

The computer system is for determining the time interval necessary between exposures of the film in an aerial camera to provide a sufficient and constant overlap of photographic frames of the film. The computer system automatically deenergizes the camera control system when the reconnaissance aircraft exceeds a predetermined velocity or altitude. (Author)

Patent 3,145,072 Div. 24, 8

PHOTOGRAPHIC RECORDER.
Air Force-assigned Patent,
by Paul J. Daly and Joseph F. Clark. 18 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photographic recording systems), (*Photographic recording systems, Pulse analyzers), (*Pulse analyzers, Photographic recording systems), Oscilloscopes, Cathode ray tubes, Circuits, Photographic techniques, Recording systems.

An electronic signal analyzer system is provided for displaying on a cathode ray oscilloscope a series of successive pulses superimposed on a stepped-output signal and a camera interconnected with the system to photographically record the series of pulses being analyzed. The series of pulses to be analyzed are applied to a pair of input circuits. The first of the pair of input circuits provides a time delay for the series of pulses being analyzed. The second input circuit accepts the series of pulses; the first pulse and each successive pulse of the series triggers the sweep of the cathode ray oscilloscope.

Patent 3,146,341 Div. 24

FILM READER.
Army-assigned Patent,
by Clifford J. Maloney and Lee F. Miller. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Film readers), Photographic film, Light pulses.

The apparatus is for reading information appearing in the form of transparent dots positioned in transverse rows on an opaque moving film. The film is non-perforated 35 mm. film. A plurality of channels may be used for detecting light pulses.

Patent 3,148,585 Div. 24

AUTOMATIC APPARATUS FOR FILM PRINTERS.
Navy-assigned Patent,
by Norbert J. Armstrong and William R. Wentz.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photographic printers), (*Photographic printers, Automatic), Electronic

equipment, Photographic film, Time-delay relays, Density.

An electronically controlled apparatus is provided for automatically transporting through a printer individual negatives on a roll of 4 1/2 X 4 1/2 inch format exposed film. As the film is transported through the printer, an electronic light sensitive scanner meters the film. When the scanner detects the area of low density which is the spacing between negatives on the film, it automatically energizes a time delay relay. After a predetermined time, the time relay is actuated and causes the movement of the film to be stopped. Because the length of the format or negative area is constant, the distance the film has to travel to be exactly centered within the printer after the low density area is detected is easily ascertainable and the time delay relay is accordingly set.

PB-166 434 Div. 24
OTS Prices: HC $1.00/MF $0.50

Stanford Research Inst., Menlo Park, Calif.
AN ELECTROSTATIC PRINTING TUBE FOR ELECTRONIC DUPLICATION,
by R. W. Crews, H. C. Borden, and P. Rice. 26 Oct 56, 7p
Unclassified report

Delivered at the IRE PGED Meeting, Washington, D. C. 26 Oct 56 by P. Rice.
Legibility of this document is in part unsatisfactory. Reproduction has been made from best available copy.

Descriptors: (*Electrophotography, Image tubes), (*Image tubes, Electrophotography), Recording paper, Dielectric recording systems.

Some attempts have been made to reproduce photographs. There is no reason to believe that we can achieve much of a grey scale with our tube, since charge is either deposited or not, but using a screened negative, we should be able to obtain good results. A system was developed which shows considerable promise speifically in the field of high speed duplication and also in the general field of high speed printing. As a duplicator, it requires no master, will duplicate printing or line drawings, and operates at high speed. One scanner can feed a number of printers which may be located any distance from the scanner. Many quite ordinary types of paper will retain charge long enough for the image to be developed. The device as described makes use of analog data. If the need arises, means can be devised which would permit the same type of equipment to operate from digital data. (Author)

25. Physics

Patent 3,143,448 Div. 25, 8

PHOTOMAGNETOELECTRIC CELL AND METHOD.
Army-assigned Patent,
by Herbert Mette and Arthur Boatright. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Photoelectric cells (Semiconductor)), (*Photoelectric cells (Semiconductor), Manufacturing methods), Semiconductor devices, Magnetic properties, Photosensitivity.

The method relates to the sensitizing of the exposed surface of a thin layer of n-type germanium semiconductor material to produce a photomagnetoelectric cell. The method involves the use of a masking wax and etching and rinsing steps. (Author)

26. Production and Management

CAPE-1050 Div. 26, 20

Hanford Atomic Products Operation, Richland, Wash.
ISOTOPES PRODUCTION PLANT.
Engineering Material.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Isotopes, Industrial plants), (*Industrial plants, Isotopes), Design, Shielding, Concrete, Stainless steel, Structure parts, Handling, Radioactive isotopes.

This package contains 36 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). The conceptual design for the isotope production plant consists of a circular process building 140 ft in dia and 69 ft high with an attached single-story service building 100 x 120 ft. The process building contains a circular, concrete-shield structure 103 ft in dia, which is divided into 11 manipulator cells and eight process vaults. The eight wet chemistry cells are located below grade level. Six of these are 15 ft deep; two cells, including the pool and solvent extraction column cells, are 26 ft deep. These vaults are accessible from the top by a crane through removable, 5 ft 4 in. thick concrete cover blocks. The cell floors are lined with stainless steel, and the walls and cover blocks are coated with radiation-resistant paint. Each of the manipulator cells is 16 ft high. These cells are accessible by crane from the top and through doors in the back of the cells. Shielded pass-through are used to transfer material from the cell access area into the cells. The plant will be capable of high-volume production of encapsulated heat sources of 90Sr, 131Cs, 144Ce, and 144Pm. (AEC abstract)

CAPE-1092 Div. 26, 20

Hanford Atomic Products Operation, Richland, Wash.
PIPE CONNECTORS.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Pipe fittings, Mechanical drawings), Pipes, Wrenches, Remote control systems, Dust, Seal (Stoppers).

This package contains 27 drawings. For a listing of individual titles, see the Engineering Materials List (TID-4100). The Hanford jumper pipe connectors are used for vertical and horizontal arrangements and include 1, 2, 3, and 4 in. sizes. Drawings are included of a remotely operated impact wrench and dust caps to be placed over unused cell pipe connections. (AEC abstract)

CAPE-1114 Div. 26, 30

Union Carbide Nuclear Co., Oak Ridge, Tenn.
PNEUMATIC FILTER PAPER PRESS.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Pneumatic devices, Mechanical drawings), (*Presses (Machinery), Pneumatic

devices), Paper, Liquid filters, Pellets, Air, Beryllium compounds, Oxides, Electrodes, Aluminum, Spectroscopy, Test equipment.

One drawing is included. For a listing of individual titles, see the Engineering Materials List (TID-4100). The press is used to pelletize 1 1/4 in. dia. filter paper, used to collect industrial hygiene air and beryllium oxide samples, so that the pellets may be loaded into the crater of a graphite spectrographic electrode. A piece of paper 1 1/4 in. dia. is folded in the middle to form a semi-circle with the sample side inside. The paper is then inserted into the slot of a steel wire so that the wire approximately bisects the paper. The wire is rotated so that the filter paper is rolled into a cylinder. The cylinder of paper is inserted into the pelletizing chamber and the wire is withdrawn. The chamber door is closed and air pressure is applied. The pressure is released and the pellet is removed and placed in the crater of the electrode. The electrode is placed with the other electrodes in an Al electrode block and put in a muffle furnace to char the paper to an ash. The electrode is then ready to arc in a spectrograph. (AEC Abstract)

OTR-101 Div. 26, 17
OTS Prices: HC $0.50/MF $

National Bureau of Standards, Washington, D. C.
Inst. for Applied Technology.
HOT MACHINING; A MEANS OF LOWER COST TURNING AND MILLING OF HARD STEELS AND SUPERALLOYS.
Sep 64, 9p

Unclassified report

Descriptors: (*Machining, Heating), (*Alloys, Machining), Metals, Steel, High-temperature research, Tool steel, Stainless steel, Nickel alloys, Cobalt alloys, Titanium alloys, Refractory metal alloys, Cutting tools, Life expectancy, Costs, Material removal, Titanium, Reviews, Tungsten, Niobium alloys, Tantalum alloys, Tungsten alloys, Molybdenum alloys, Vanadium alloys, Chromium alloys, Aluminum alloys.

Significant reports covering the period since 1960 were selected for this study, with reference to relevant earlier works. Hot machining, using a choice of several methods of heating the workpiece to temperatures up to 1000F, offers easier and cheaper turning and milling of many metals and alloys finding aerospace applications. Greatest improvements in tool life, cutting speeds, and costs appear possible on hardened low alloy and tool steels, although significant improvements on stainless steels, nickel and cobalt base alloys are also attainable. The methods tested did not produce improvement in drilling of steels or superalloys, or in turning or milling of titanium and refractory metals.

Patent 3,143,884 Div. 26, 32

SAMPLING DEVICE.
Agriculture-assigned Patent,
by John E. Brekke. 11 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Samplers), (*Samplers, Fruits), Quality control, Tanks (Containers), Liquids, Rods, Design.

The device is adapted for obtaining samples of olives, cherries, or the like from a tank containing a brine or other fluid. The device includes a hub with upstanding rods around its periphery and a handle having one end positioned in the center of the hub.

Patent 3,144,370 Div. 26, 14, 17

METHOD FOR JOINING METALLIC MEMBERS.
Air Force-assigned Patent,
by Dwight G. Bennett, Richard M. Spriggs, and Henry G. Lefort. 11 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bonding), (*Bonding, Stainless steel), Aircraft, Guided missiles, Ceramic materials, Adhesives, Joining.

The metallic members of the stainless steel type are used in aircraft and missiles. Two metallic members are bonded together by ceramic adhesive layers. A space screen carrier is embedded between the two adhesive layers.

Patent 3,144,948 Div. 26, 30

COLLOCATING MACHINE USING A TIME-POSITION CODE.
Commerce-assigned Patent,
by Seymour Henig. 18 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Data processing systems), (*Data processing systems, Collecting methods), Automatic, Processing, Classification, Coding, Machines.

A mail or letter collocator is provided which utilizes a keyboard in which the keys are designated by an overlay in the same order as the addresses in the carrier's route, so that the carrier need not memorize a code group for each address. The sorting is accomplished by generating a time-position code and assigning each pulse in the code to a particular destination.

Patent 3,145,103 Div. 26, 17

HOT PRESSING BARRIER MATERIAL.
Air Force-assigned Patent,
by Robert G. Carlson. 18 Aug 64

Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hot working), (*Refractory metals, Powder metallurgy), Powder metals, Dies, Graphite, Carbon, Tantalum.

Powdered refractory metal is hot-pressed in a graphite die by interposing a carbon barrier of tantalum between them.

PB-166 402 Div. 26, 4
OTS Prices: HC $3.00/MF $0.50

SOVIET RESEARCH AND DEVELOPMENT IN FLUIDIZED BEDS.

Dec 64, 57p PAL-64-10

Unclassified report

Descriptors: (*Manufacturing methods, Particles), (*Particles, Flotation), Reviews, Bibliographies, USSR, Industrial research, Heat transfer, Adsorption, Chemical reactions, Coal, Solids, Catalysis, Refining (Metallurgy), Refineries, Metallurgy, Chemical industry, Petroleum industry, Ores (Metal sources), Ores (Non-metallic), Fluid mechanics.

A review is given of the status of Soviet capabilities in fluidized-bed technology, including applications to

the chemical, petroleum, and metallurgical industries. It is based primarily upon critical evaluation of open Soviet technical literature of the period 1958 through the end of 1963. The report includes a bibliography with citation to 356 references and tables listing the principal Soviet authors and installations in fluidized-bed research and development. Greatest concentration of Soviet effort is in the metallurgical industries where competence is under way with demonstration of technological originality and capability for supporting future growth of the Soviet chemical industry. Less interest and activity are evident in the improvement of fluidized-bed catalytic cracking and other petroleum refining processes.

27. Propulsion Systems

Patent 3,141,769 Div. 27, 17

METHOD OF PRODUCING POROUS TUNGSTEN IONIZERS FOR ION ROCKET ENGINES.
NASA-assigned Patent,
by Neal T. Saunders. 21 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ion sources), (*Ion engines, Ion sources), Porous metals, Tungsten, Fatty acids, Powder metallurgy, Sintering, Production.

The ionizer is made by mixing tungsten powder of a specific particle size with a mixture of a long chain fatty acid, pressing the mixture and sintering the compact in a non-oxidizing atmosphere.

Patent 3,144,200 Div. 27

PROCESS AND DEVICE FOR CRYOGENIC ADSORPTION PUMPING.
AEC-assigned Patent,
by Clyde E. Taylor, Angus L. Hunt, and John E. Omohundro. Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Gas pumps), (*Gas pumps, Hydrogen), (*Cryopumping, Gas pumps), Adsorption, Vacuum apparatus, Surface properties, Cooling, Thermal conductivity, Cryogenics.

The device is for pumping hydrogen gas at a high rate. The device comprises an adsorption element having a thermally conducting surface within a vacuum chamber, and arrangements for evacuating the chamber to high vacuum, for cooling the surface to about 11 degrees K. and for the alternate introduction of either hydrogen or a substrate gas into the chamber.

Patent 3,144,877 Div. 27

CLUSTERED DUAL VALVE CONTROL FOR ROCKET LIQUID FUEL SYSTEM.
Air Force-assigned Patent,
by John R. Prybylski and Clement J. Turansky.
18 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Rocket components), (*Liquid rocket fuels, Control systems), (*Values, Liquid rocket fuels), Pneumatic valves, Pneumatic systems, Gas generating systems, Fuel pumps, Propellant control.

The clustered dual valve control is for use on a gas generating apparatus used to drive the fuel and oxidizer pumps supplying fuels to the combustion section of a rocket engine. The control includes a pair of poppet valves clustered in a common housing and actuated by a piston and a solenoid operated valve or piston control valve. The feed valve and piston control valve are joined to form a unit structure.

Patent 3,146,669 Div. 27, 12

COLLAPSIBLE NOZZLE EXIT CONE FOR TUBE LAUNCHED MISSILE.
Navy-assigned Patent,
by Calvin J. Wolf. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Exhaust nozzles), (*Exhaust nozzles, Guided missiles), Nozzles, Exhaust gases, Launching.

The collapsible exit nozzle is for a tube launched missile. The nozzle, upon leaving the launching tube, is expanded to a diameter which allows complete expansion of the exhaust gases. The nozzle, after expansion, is locked in place.

28. Psychology and Human Engineering

No Entries

29. Quartermaster Equipment and Supplies

Patent 3,148,531 Div. 29, 1, 30

METHOD AND APPARATUS FOR THERMAL ANALYSES.
Navy-assigned Patent,
by Alice M. Stoll and Lambert R. Munroe.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Fire-resistant textiles), (*Flight clothing, Thermal properties), Temperature, Thermal diffusion, Test methods.

The apparatus is for determining the thermal properties of garments used in air and space vehicles. The apparatus is for flame destruction temperature tests. The temperature rise in the base on which the material is mounted is measured. The temperature rise so measured is a direct function of the thermal diffusivity of the material.

30. Research and Research Equipment

CAPE-506 Div. 30

Lawrence Radiation Lab., Univ. of California, Berkeley.
CONTROLLED ATMOSPHERE CHAMBER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear spectroscopy, Controlled atmospheres), (*Controlled atmospheres, Specifications), Radioactive isotopes, Radioactivity, Vacuum apparatus, Vacuum pump, Electrodes, Electric arcs, Mechanical drawings.

The chamber is used in emission spectroscopy of radioactive elements. The vacuum-tight chamber is positioned around the arc spark during excitation to keep radioactivity from escaping and contaminating the glove box. The lid is fastened to the base by a quarter-turn breech thread. A rubber 'O' ring is used to secure a good vacuum connection. Vertical motion of the electrode holders is through brass bellows in the base. During operation of the chamber, air is moved by a vacuum pump at about 2.5 cfm. Seventeen drawings are included. (AEC Abstract)

CAPE-916 Div. 30, 20, 25

Lawrence Radiation Lab., Univ. of California, Berkeley.
X-RAY SPECTROMETER, 10 INCH.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Nuclear radiation spectrometers, Mechanical drawings), (*X-ray spectroscopy, Nuclear radiation spectrometers), X rays, Radioactive decay, Transuranium elements.

The monochromatic bent crystal x-ray spectrometer is used in the analysis of L-series x rays produced in radioactive decay processes of transuranium elements. There is good agreement between the energy values of the L-series lines measured with the spectrometer and those predicted. (129 drawings). (AEC abstract)

CAPE-1093 Div. 30, 2

Brookhaven National Lab., Upton, N. Y.
INTERMITTENT ROTOSLIDE SAMPLER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Samplers, Specifications), (*Atmosphere, Particles), (*Pollen, Samplers), Allergy, Rotation, Design.

The rotoslide sampler utilizes the principles of the 'rotorod' developed by Perkins and Leighton of Stanford University to efficiently impact large particles in the atmosphere independent of wind speed. The rotorod has two defects in terms of sampling aeroallergens. It is difficult to count the particles under a microscope and it is impractical for long-period utilization because an excessive number of particles reduces further collection. The rotoslide sampler utilizes the original principle of the Stanford development, but includes modifications that eliminate these difficulties. In the rotoslide, glass microscope slides are rotated by a drive motor at 1700 rpm. A cylindrical plastic shield is automatically raised to prevent spurious collection when the device is inoperative. The sampler can be used with an appropriate time cycle to obtain representative 24 hr samples without over-loading. The device was sufficiently successful to be submitted to the National Academy of Allergy as a possible substitute for the Durham slide collector as a standard pollen sampler. Twenty-four drawings are included. (AEC abstract)

CAPE-1099 Div. 30

Savannah River Lab., Aiken, S. C.
MONOCULAR PERISCOPE
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Metallography, Periscopes), (*Periscopes, Metallography), Stainless steel, Metal plates, Microscopes.

Designed to be used in metallography, the oval stage plate is fabricated of 1/2 in. stainless steel and has a long axis of 6 6/8 in. and a short axis of 4 6/8 in. It is attached to a shaft 10 1/8 in. long that is mounted on a tripod 1 3/4 in. high. See CAPE-1019 (NSA 17: 35966) for description of cell and monocular periscope. (AEC abstract)

CAPE-1109 Div. 30, 20

Hanford Atomic Products Operation, Richland, Wash.
JUMPER CHECKING JIG PUREX FACILITY .
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Jigs, Mechanical drawings), Checkout equipment, Remote control systems, Radioactive waste, Disposal, Production, Configuration.

Drawings (18) are included for the mechanical jumper checking jig that permits the fabrication of Hanford Jumpers to tolerances of ± 1/16 in. It is flexible in application and permits a wide variety of jumper sizes and configurations to be fabricated when over-all dimensional accuracies must be maintained to permit in-cell installation by remote handling methods. The jigs were designed in 1953 for the Purex facility. (AEC abstract)

CAPE-1112 Div. 30

Dow Chemical Co., Denver, Colo.
DRY BOX SYSTEM FOR MASS SPECTROMETER.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Laboratory equipment, Mechanical drawing), (*Mass spectroscopy, Laboratory equipment), Stainless steel, Acrylic resins, Glass, Dehydration.

Thirteen drawings are included. For a listing of individual titles, see the Engineering Materials List (TID-4100). The dry box system is located in a laboratory 180 ft long and 19 ft wide. It contains the mass spectrometer box, two 4 ft wide balance hoods, an 8 ft long fume hood, an arc dry box, conveyor dry boxes, and 4 chemical dry boxes. The mass spectrometer box is fabricated of strip, bar rolled 304 stainless steel plate 27 1/2 in x 40 in. x 23 in. high. There is a 1/2-in. thick Plexiglas viewing window 34 in. x 13 1/4 in. Two 8 in. in dia. glove ports are located in the front of the boxes. The arc stand dry box is fabricated of 18.8 stainless steel and is 3 ft x 2 ft 9 in. x 3 ft 3 in. high. The box also has two 8 in. glove ports and a 1/4 in. thick safety glass window 13 1/2 in.

x 25 1/2 in. The conveyor boxes are 6 ft x 2 ft 6 in. x 3 ft high. The end panels have a 21 7/8 in. dia. opening. (AEC abstract)

CAPE-1118 Div. 30

Union Carbide Nuclear Co., Oak Ridge, Tenn.
BERYLLIUM CHIP PRESS DIE.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Test equipment, Mechanical drawings), (*Dies, Presses (Machinery)), (*Beryllium, X-ray spectroscopy), Chlorides, Powder metals, Particles, Specifications.

This package contains 1 drawing. For a listing of this title, see the Engineering Materials List (TID-4100). The Be chip press die is used to prepare Be samples used in determining microgram quantities of chloride in Be metal powder utilizing x-ray emission spectrometry. Ten grams of clean Be chips are pressed at 61 tons for approximately 10 sec. Clean gloves should be worn so that the metal is not contaminated. The cylindrical protective sleeve is 4.5 in. in dia, 3.125 in. high, and 0.25 in. thick. The shrink ring is 4 in. in dia, 3.125 in. high, and 1 in. thick. The die core is 1.95 in. OD, 1.45 in. ID, and 3.125 in. high. The forming pin is 2 in. high and 1.5 in. in dia. The load block is 4 in. in dia and 1.5 in. thick. Specifications for fabricating parts are included on the drawing. (AEC abstract)

CAPE-1138 Div. 30

Oak Ridge National Lab., Tenn.
TUBING TANK.
Engineering Materials.
Unclassified drawing
Price information available from OTS upon request.

Descriptors: (*Pipes, Test equipment), (*Tanks (Containers), Specifications), Ultrasonic radiation, Surfaces, Design, Transducers, Operation.

The package contains 14 drawings and 1 photograph. The tank includes mechanical equipment used in ultrasonic testing of tubing. The equipment holds the tubing straight as it is rotated around its axis, keeps the transducer in proper alignment, and translates the transducer along the length of the tube at a rate that permits the sound beam to cover and test the surface of the tubing. The tank accommodates all normal tubing lengths and provides racks for material handling on the tank sides. A motor mounted at one end, operated by a variable speed control, is coupled to a gear reducer, which chain drives a data potentiometer, which provides the rotational signal to the 'B' scan, a spindle mounted on a Jacobs chuck, and a second gear reducer. The second gear reducer rotates a sprocket which moves an endless roller chain extending the length of the tank. Reinforced plastic guide plates attached at intervals to the chain give support and steadying force to the tubing during inspection. A scanning dolly is mounted on the chain, which holds the ultrasonic search tube and the transducer. Two face plates are attached to the scanning dolly for additional steadying for small diameter tubing. A tailstock prevents excessive whip of the tube in rotation. As the tubing is rotated, the scanning dolly and transducer are translated along the length of the tubing at a definite ratio of rotation to linear speed that is controlled by the gear reducer and sprocket. (AEC Abstract)

Patent 3,140,820 Div. 30

METHOD FOR MAINTAINING VERY HIGH VACUUM IN A SYSTEM.
AEC-assigned Patent,
by Robert E. Clausing. 14 Jul 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vacuum apparatus), (*Vacuum apparatus, Pumps), Diffusion pumps, Titanium, Vacuum, Gases.

High vacuum is maintained in a system by utilizing a large-scale getting pumping facility in combination with a modest sized diffusion pump. Titanium is employed as the getter. High vacuum is maintained in a system where a gaseous material is continuously introduced into the system.

Patent 3,142,980 Div. 30, 17

FAST ACTING TENSILE TESTER.
Army-assigned Patent,
by Axel G. H. Andersen. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Test equipment), (*Test equipment, Tensile properties), (*Tensile properties, Test equipment), Metals, Pneumatic devices, Pistons, Damping.

The testing machine is for testing the tensile characteristics of metals. The machine is powered by a pneumatically energized piston. The surplus energy of the moving components, subsequent to parting of a specimen, is absorbed by rapidly damping oscillations of the piston assembly between two air cushions.

Patent 3,143,727 Div. 30, 8

MAGNETIC MEMORY AND SWITCHING CIRCUIT.
Navy-assigned Patent,
by Walter L. Morgan. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Computer storage devices), (*Magnetic core storage, Ratents), (*Switching circuits, Magnetic cores), Winding.

An arrangement is provided for reading the information out of a shift register without destroying the information existing in the register. Parallel output storage cores are provided one each for a corresponding core of the shift register and each having input and output windings thereon. A unilateral impedance between one side of each of the shift register core output windings and corresponding input winding on the output core is poled to pass information of a predetermined polarity from the output windings to the storage cores.

Patent 3,143,731 Div. 30

DIGITAL ENCODER.
Navy-assigned Patent,
by Charles L. Bossard. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Analog-to-digital converters), (*Analog-to-digital converters, Magnetic fields),

Magnetic properties, Wire, Armatures, Digital systems, Coding.

The device transforms the position of a body, such as a shaft, directly into a digital code. The basic concept of the converse Weidman magnetic effect is utilized. A number of magnetically permeable wires are twisted and secured in a matrix. As a strong magnetic field associated with an armature is passed by the ends of the wires, each wire will in turn be changed in magnetic state and a pulse will appear between the ends of the wire.

Patent 3,143,965 Div. 30, 2, 6, 12

CHAFF DISPENSER.
Navy-assigned Patent,
by Andre E. La Pointe. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Wind direction indicators), (*Radar confusion reflectors, Meteorological radar), (*Release mechanisms, Rocket heads), (*Wind, Tracking), High altitude, Timing devices, Launching, Rockets, Meteorological instruments.

The rocket head is adapted to disperse a quantity of radar reflective material at a predetermined time after launching of a rocket, for the purpose of tracking high altitude wind currents. The rocket head carries a timer mechanism. The timer mechanism is adapted to be activated by the firing of the rocket to which the head is attached.

Patent 3,145,747 Div. 30

FREE DROP CONTAINER.
Army-assigned Patent,
by Jess H. Nourse and William B. Crawford.
25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Containers), (*Containers, Liquids), Aircraft, Textiles, Impregnation, Fluid flow, Inhibition, Impact shock, Drop testing.

The free drop container is designed to hold liquids and to be dropped from an aircraft. It is made of one or more plies of textile material which has been impregnated with a rubber-like material. The structure is such that the bulk of the liquid is confined in a central portion of the container during the free fall. An arrangement is also shown for retarding the flow of the liquid out of the central portion upon impact.

Patent 3,145,874 Div. 30, 9

MEANS FOR CONTROLLING RUPTURE OF SHOCK TUBE DIAPHGRAMS.
NASA-assigned Patent,
by Donald Baganoff. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Shock tubes), (*Shock tubes, Diaphrams (Mechanical)), Rupture (Mechanics), Control systems, Pressure, Gases, Dynamics.

The shock tube structure is utilized in physio-chemical research, gas-dynamic studies, and aerodynamic studies, especially for supersonic research. The structure includes a high pressure tube section, a low pressure tube section, a diaphragm between the tube sections, an internal screw-threaded device for adjustment of a knife structure, including several blades.

Patent 3,145,920 Div. 30

FLOATING-POINT KEYPUNCH MACHINE.
Commerce-assigned Patent,
by Anthony A. Berlinsky, Martin J. Brennam, and Charles H. Stockton. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Data processing systems), Punched cards, Machines, Automatic, Control sequences, Computer operators, Data storage systems, Electronic accounting machines.

A machine is provided with an automatic floating-point operation that is controlled by a program card so that the operator requires no additional instruction. The operator, using this machine and observing a number to be recorded in a card, sequentially strikes the keys on his keyboard corresponding to the digits of the number. The significant digits are stored in a key storage unit; the remaining digits are counted by a floating-point counter. When the add key is depressed, the significant digits and a count of the remaining digits are recorded in the card.

Patent 3,146,360 Div. 30

PIEZOELECTRIC TIME-OF-ARRIVAL GAGE.
Navy-assigned Patent,
by John M. Marshall. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Piezoelectric gages), (*Piezoelectric gages, Timing devices), (*Timing devices, Shock waves), (*Shock waves, Piezoelectric gages), Shock tubes, Test equipment, Crystal detectors, Piezoelectric crystals, Barium alloys, Titanates.

The time-of-arrival gage is for use with a shock tunnel device to sense the exact time that a shock wave arrives at a particular point. Barium titanate is used in the detector. The structure enables easy removal and replacement of components.

Patent 3,146,528 Div. 30, 31

BEARING TESTER.
Navy-assigned Patent,
by Ralph A. Goulet and Tyrie S. Randolph. 1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Ball bearings), (*Ball bearings, Test equipment).

The device is for checking the radial internal clearance of a ball bearing. The tester locks the inner race of a bearing to be tested to a spindle and then applies a radial load to the bearing's outer race through a unique pivoting system. The load first applied is then removed, and a similar load is applied in an opposite direction to the outer race. The movement of the outer race is shown by a dial indicator.

Patent 3,149,289 Div. 30

SIGNAL GENERATOR.
Navy-assigned Patent,
by Bernard W. Moss. 15 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Signal generators), (*Signal generators, Patents), Doppler systems, Radio signals, Amplitude modulation, Frequency modulation, Simulation.

The signal generator produces a signal linearly modulated both as to amplitude and frequency. It is useful in simulating doppler radio signals. The signal generator includes four stabilized oscillators, each of which includes provisions for keying the output, two balanced modulators, an adding network, two reactance tubes, two filters, an envelope demodulator and a discriminator.

31. Ships and Marine Equipment

Patent 3,143,457 Div. 31, 14

VIBRATION DAMPING TREATMENTS.
Navy-assigned Patent,
by Ross E. Morris. 4 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Vibration isolators), (*Vibration isolators, Submarines), (*Damping, Ship structural components), Vibration, Sheets, Butyl rubber, Bonding, Honeycomb cores, Sandwich construction, Acoustic insulation, Metals.

The damping treatment for submarine structrual members gives sound insulating characteristics. A structural section is made of a metal sheet, a cellular vulcanized butyl rubber layer bonded to the metal and a butyl rubber overlayer bonded to the cellular layer.

Patent 3,144,279 Div. 31, 27

SLIDING CONTACT BEARING FOR CONTRA-ROTATING SHAFTS.
Navy-assigned Patent,
by Watt V. Smith. 11 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Bearings), (*Bearings, Shafts), Ship structural components, Marine engineering.

The sliding contact bearing is for coaxial shafts for contra-rotating ship propellers. An intermediate sleeve member is shown between the coaxial shafts that provides a slider bearing for the inside of the outer shaft and for the outside of the inner shaft. An arrangement is disclosed for controlling the angular velocity of the intermediate sleeve member with respect to the inner coaxial shaft so that the slider bearing has a maximum or useful load carrying capacity. (Author)

Patent 3,145,016 Div. 31, 27

HOISTING APPARATUS.
Navy-assigned Patent,
by William G. Daymon, Jr. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Hoists), (*Hoists, Jet engines), (*Jet engines, Hoists), Aircraft carriers, Storage, Armed forces transportation.

The universal type hoisting mechanism is for jet engines. It is used aboard an aircraft carrier to transport jet engines from a storage area to a dehumidification chamber and thence to the aircraft. The hoist has a single pickup point which may be adjusted under load to a position directly above the center of gravity of the jet engine being hoisted.

Patent 3,145,617 Div. 31, 22

TORPEDO TUBE COVER.
Navy-assigned Patent,
by John T. Gondek. 25 Aug 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Protective coverings), (*Torpedo launchers, Protective coverings), (*Protective coverings, Torpedo launchers), Cylindrical bodies, Flexible structures, Ordnance.

The elongated cylindrical tube receives a torpedo launching tube. It has an outer casing of flexible material overlying a cushion layer whereby ice can be removed from it by repeated blows delivered to it. (Author)

Patent 3,147,431 Div. 31, 30

APPARATUS FOR MEASURING AND RECORDING THE CONDUCTIVITY OF SEA WATER AS A FUNCTION OF DEPTH.
Navy-assigned Patent,
by Donald F. Bennett and Edward W. Johnson, Jr.
1 Sep 64
Unclassified patent

Available from Commissioner of Patents,
Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Oceanographic equipment), (*Mines (Ordnance), Countermeasures), (*Conductivity, Sea water), Depth indicators, Mine detectors, Underwater equipment, Servomechanisms, Recording systems.

The conductivity of sea water, as a function of depth is obtained from a moving ship. The conductivity of sea water is important in mine countermeasures. The apparatus is called a bathyconductograph. A torpedo-shaped vehicle is used. It contains a depth sensing element, a conductivity bridge circuit, a servo system and a recording system.

Patent 3,148,849 Div. 31, 1

ARRESTING WIRE SUPPORT.
Navy-assigned Patent,
by James Methven and Edwood Schollenberger.
15 Sep 64
Unclassified patent

Available from Commissioner of Patents, Washington, D.C., 20231, $0.25

Descriptors: (*Patents, Arresting gear), (*Arresting gear, Supports), Wire, Supports, Aircraft, Aircraft carriers, Flight decks.

The support is for holding an aircraft pendant at a predetermined elevation above a landing surface such as the deck of a ship. The structure includes a leaf spring placed under the pendant, which is adapted to be flexed between flat and arcuate shapes.

PB-166 365 Div. 31
OTS Prices: HC $4.00/MF $0.75

Dunlap and Associates, Inc., Darien, Conn.
OPERATIONAL ANALYSIS OF THE ABANDONMENT OF MERCHANT SHIPS AT SEA,
Jul 64, 110p DRE-63-16(400)
Contract MA3162

Unclassified report

Descriptors: (*Merchant vessels, Abandonment), (*Sea rescue equipment, Merchant vessels), (*Abandonment, Merchant vessels), Ships (Nomitary), Accidents, Disasters, Safety, Survival, Operations research, Personnel, Training, Decision making, Sea rescues.

The objective of this study is to identify the critical aspects of the problems associated with the abandonment of merchant vessels in distress, and to suggest possible ways in which more lives may be saved. The research plan was to obtain a clear understanding of the entire abandonship process, as it is currently performed. A systematic review of this information was therefore made from published data, case histories, individual survival experiences, and interviews. The U.S. Coast Guard Marine Board of Investigation records were utilized as a primary source of information on the abandonment of U.S. merchant ships. An initial sample of 91 cases was screened, and a working sample of 48 was examined in detail.

32. Miscellaneous Arts and Sciences

PB-166 317 Div. 32, 23
OTS Prices: HC $5.00/MF $1.00

Research Analysis Corp., McLean, Va.
SOVIET LABOR PRODUCTIVITY.
Technical memo.,
by Irving H. Siegel. May 52, declassified, 156p
RAC-T-125
Contract DA44 109qm266
AD 65 149 Unclassified report

Descriptors: (*Industrial production, USSR), (*USSR, Industrial production), (*Economics, USSR), Labor, Wages, Consumption, Commerce, Money, Railroads, Steel industry, Textile industry, Agriculture, Government (Foreign), Communism, United States government, Statistical data.

A study of Soviet labor productivity showed that the USSR was far behind the United States in output per worker and behind the Western World in output and consumption per capita. Disparity between Soviet and United States output per capita was greater than before the war. Measurement by the most authoritative Western methods indicated more modest gains in output per worker than those claimed by USSR and an estimated 1950 yield figure no higher than that of 1940. It was assumed that given a few years of peace, the USSR should be able to raise its productivity well above the pre-war level, but that peculiarities of the Soviet system would prevent full realization of the potential productivity implicit in its investment and labor-training programs. Slow liquidation of labor surplus as auxiliary industrial tasks are mechanized now depresses productivity, but in the event of war, it may be possible for the USSR to raise productivity sharply and maintain output while labor is released for military duty.

33. Transportation

No Entries

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